

# **FURUNO**

## **OPERATOR'S MANUAL**

### *SATELLITE COMPASS™*

**Model**

**SCX-20**

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NMEA 2000 Specification

# IMPORTANT NOTICES

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## General

- This manual has been authored with simplified grammar, to meet the needs of international users.
- The operator of this equipment must read and follow the instructions in this manual. Wrong operation or maintenance can void the warranty or cause injury.
- Do not copy any part of this manual without written permission from FURUNO.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and the equipment specifications can change without notice.
- The example screens (or illustrations) shown in this manual can be different from the screens you see on your display. The screens you see depend on your system configuration and equipment settings.
- Save this manual for future reference.
- Any modification of the equipment (including software) by persons not authorized by FURUNO will void the warranty.
- The following concern acts as our importer in Europe, as defined in DECISION No 768/2008/EC.
  - Name: FURUNO EUROPE B.V.
  - Address: Ridderhaven 19B, 2984 BT Ridderkerk, The Netherlands
- The following concern acts as our importer in UK, as defined in SI 2016/1025 as amended SI 2019/470.
  - Name: FURUNO (UK) LTD.
  - Address: West Building Penner Road Havant Hampshire PO9 1QY, U.K.
- All brand, product names, trademarks, registered trademarks, and service marks belong to their respective holders.

## How to discard this product

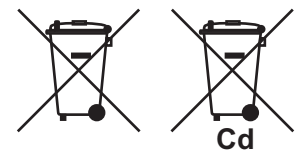
Discard this product according to local regulations for the disposal of industrial waste. For disposal in the USA, see the homepage of the Electronics Industries Alliance for the correct method of disposal.

## How to discard a used battery

Some FURUNO products have a battery(ies). To see if your product has a battery, see the chapter on Maintenance. If a battery is used, tape the + and - terminals of the battery before disposal to prevent fire, heat generation caused by short circuit.

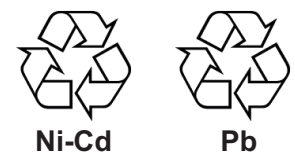
### In the European Union

The crossed-out trash can symbol indicates that all types of batteries must not be discarded in standard trash, or at a trash site. Take the used batteries to a battery collection site according to your national legislation and the Batteries Directive 2006/66/EU.



### In the USA

The Mobius loop symbol (three chasing arrows) indicates that Ni-Cd and lead-acid rechargeable batteries must be recycled. Take the used batteries to a battery collection site according to local laws.



### In the other countries

There are no international standards for the battery recycle symbol. The number of symbols can increase when the other countries make their own recycle symbols in the future.



# SAFETY INSTRUCTIONS

The operator and installer must read the applicable safety instructions before attempting to operate or install the equipment. Failure to comply with these safety instructions may cause injury, loss of life or damage to the equipment.

<b>DANGER</b>	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
<b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.









Warning, Caution	Prohibitive Action	Mandatory Action
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## *Safety instructions for the installer*

<b>WARNING</b>
<b>Turn off the power at the mains before beginning the installation.</b> Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.
<b>ELECTRICAL SHOCK HAZARD</b> <b>Do not open the equipment unless totally familiar with electrical circuits and service manual.</b> Only qualified personnel should work inside the equipment.
<b>Use the specified power cable.</b> Fire can result if an incorrect cable is used.
<b>Do not disassemble or modify the equipment.</b> Fire, electrical shock or serious injury can occur.

<b>CAUTION</b>		
	<b>Observe the following safe compass distances to prevent interference to a magnetic compass:</b>	
	Standard compass	Steering compass
Satellite Compass SCX-20	0.30 m	0.30 m
	<b>Ground the equipment to prevent electrical shock and mutual interference.</b>	

***Safety instructions for the operator***

 <b>WARNING</b>	 <b>CAUTION</b>
 <p><b>ELECTRICAL SHOCK HAZARD</b> Do not open the equipment unless totally familiar with electrical circuits and service manual.</p> <p>Only qualified personnel should work inside the equipment.</p>	 <p><b>Do not connect/disconnect the signal cable while turning the power on.</b></p> <p>The unit may be damaged.</p>
 <p><b>Do not disassemble or modify the equipment.</b></p> <p>Fire, electrical shock or serious injury can occur.</p>	 <p><b>No single navigation aid (including this unit) should ever be relied upon as the exclusive means for navigating your vessel.</b></p> <p>The navigator is responsible for checking all aids available to confirm his position. Electronic aids are intended to assist, not replace, the navigator.</p>
 <p><b>Turn off the power immediately if water leaks into the equipment or smoke or fire is coming from the equipment.</b></p> <p>Failure to turn off the equipment can cause fire or electrical shock. Contact a FURUNO agent for service.</p>	
 <p><b>Use the correct fuse.</b></p> <p>Use of a wrong fuse can result in damage to the equipment.</p>	

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# FOREWORD

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## A Word to the Owner of the SCX-20

FURUNO Electric Company thanks you for purchasing the FURUNO SCX-20 Satellite Compass™. We are confident you will discover why the FURUNO name has become synonymous with quality and reliability.

Since 1948, FURUNO Electric Company has enjoyed an enviable reputation for quality and reliability throughout the world. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly operated and maintained. Please carefully read and follow the operation and maintenance procedures in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our goal.

Thank you for considering and purchasing FURUNO equipment.

### **Features**

The SCX-20 is a new Satellite Compass™ designed with FURUNO advanced GPS kinematic technology. This compass has a wide range of applications for both land and sea vessels.

The main features are:

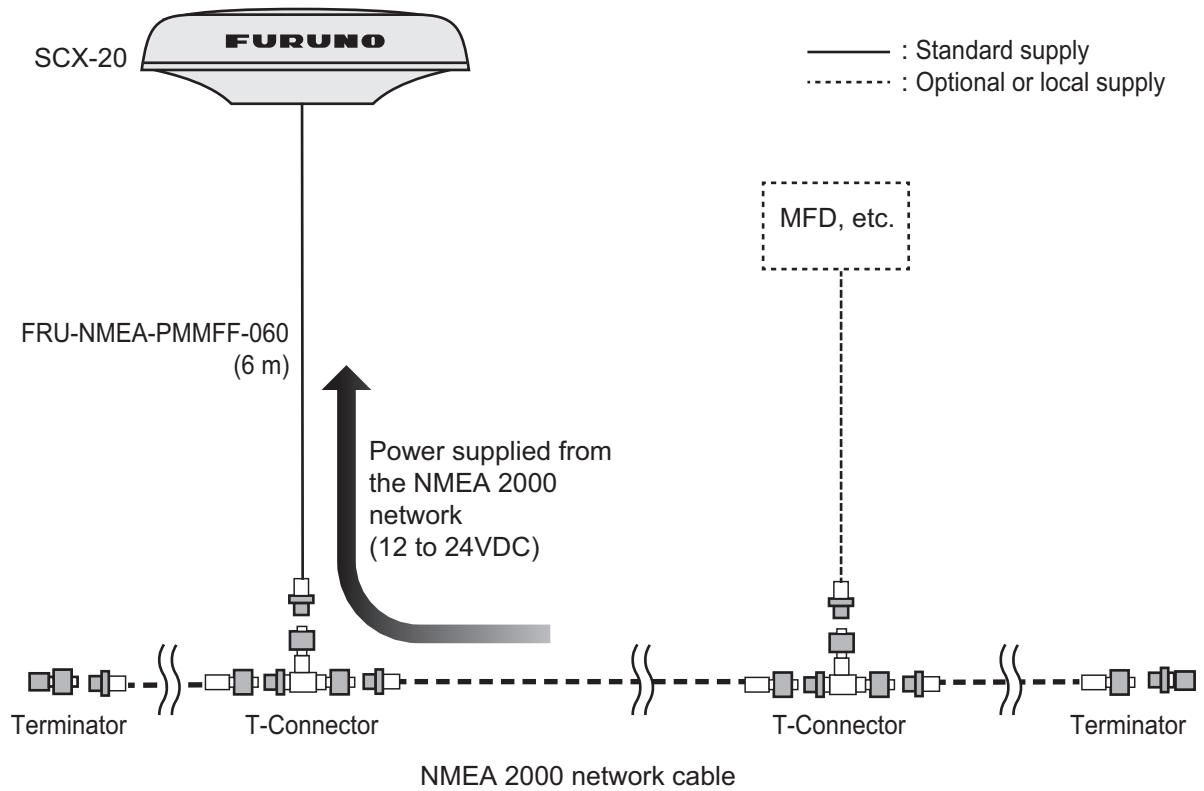
- Heading accuracy of 0.5° RMS (1.0° when stationary).
- Perfect for use as a heading sensor for RADAR/TT, Echo trails, AIS, Autopilot and scanning SONARs.
- Outputs accurate heading, position, time, speed and course.
- Pitch and roll output in digital format for ship's motion correction.
- Heave output allows for heave compensation.
- Attitude settling time of 60 seconds.
- Outputs data in NMEA 2000 format.
- Aesthetically pleasing antenna fits nicely on recreational boats.

### **Program numbers**

Unit & PC Board	PCB/Application	Program No.*
Antenna Unit	STARTER	2051599 01.xx
	BOOTER	2051600 01.xx
	APL	2051601 01.xx
	GNSS (1 to 4)	48505230 xx

\*: "xx" denotes version number.

# SYSTEM CONFIGURATION



# EQUIPMENT LIST

## Standard supply

Name	Type	Code No.	Qty.	Remarks
Antenna Unit	SCX-20	-	1	For NMEA 2000
Installation Materials	CP20-04600	000-036-768	1 (Select one)	For roof mount kit of antenna unit. Includes cable FRU-NMEA-PMMFF (6 m).
	CP20-04610	000-036-769		For pole mount kit of antenna unit with cable FRU-NMEA-PMMFF (6 m).
	CP20-04620	000-036-770		For pole mount kit (w/Mast Mounting Kit CP20-04605*) of antenna unit. Includes cable FRU-NMEA-PMMFF (6 m). *: Includes Fixing Support Fixture, Pipe and Hose Clamp ( $\phi$ 25 to 35 mm), and 20A to 25A ( $\phi$ 35 to 50 mm) diameter mast installations.

## Optional supply

Name	Type	Code No.	Remarks
Cable Assembly	FRU-NMEA-PMMFF-010	001-533-060	For NMEA 2000 network, 1 m
	FRU-NMEA-PMMFF-020	001-533-070	For NMEA 2000 network, 2 m
	FRU-NMEA-PMMFF-060	001-533-080	For NMEA 2000 network, 6 m
Right Angle Mounting-Base	NO.13-QA330	001-111-910-10	
Micro T-connector	FRU-MM1MF1MF1001	001-507-050	
Termination Resistor (Micro)	FRU-MM1000000001	001-507-070	
	FRU-MF000000001	001-507-060	
Roof Mount Kit*	CP20-04602	001-556-170	
Pole Mount Kit*	CP20-04603	001-556-200	
Mast Mounting Kit*	CP20-04605	001-556-240	Requires CP20-04603.
Hose Clamp (Large)	OP20-52	001-556-260	For 32A to 40A ( $\phi$ 35 to 50 mm) diameter mast installations.
Bird-Repellent Fixture	OP20-54	001-556-280	2 pcs.
Snow Cover Kit	OP20-53	001-556-320	

\*: Select the appropriate kit depending on the installation location and configuration.



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# 1. INSTALLATION

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## NOTICE

**Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.**

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

You can install the antenna unit as follows. See the outline drawings at the back of this manual.

- Platform mount, fixed from bottom (section 1.2)
- Pole mount (section 1.3)
- Roof mount, fixed from top (section 1.4)
- Antenna Base mount (section 1.5, option)

Use the NMEA 2000 Antenna cable (FRU-NMEA-PMMFF-060) for installation.

## 1.1 Installation Considerations

When selecting a mounting location, keep in mind the following points:

- Keep the length of the antenna cable in mind when selecting a mounting location.
- Make sure the mounting location is strong enough to support the weight of the unit. See the outline drawings at the back of the manual.
- Leave enough space around the unit for service and maintenance. See the outline drawings at the back of this manual for minimum service clearance.
- The sensor should be separated more than three meters from Inmarsat F/FB antennas. Select a location outside this transmission area.
- Do not bundle the antenna cable with radio equipment cables. When these noise reductions are insufficient, adjust the squelch on the radio equipment.
- Select a location with no obstructions to the radio waves.
- Select a location with no local vibration or impact (including vibrations generated by an engine or the mounting mast for this equipment) for the GPS sensor in the antenna unit.
- Observe the compass safe distances (see page iii) to prevent interference to a magnetic compass.

### **How to select the installation site**

The installation site must satisfy the conditions described in the antenna installation procedure at the back of this manual (Dwg. No. C7286-Y01-\*).

## 1.2 Platform Mount

The antenna unit is mounted on a level platform, with the fixing screws inserted from the underside of the unit.

### 1.2.1 Required tools

The following tools should be prepared in advance for this installation.

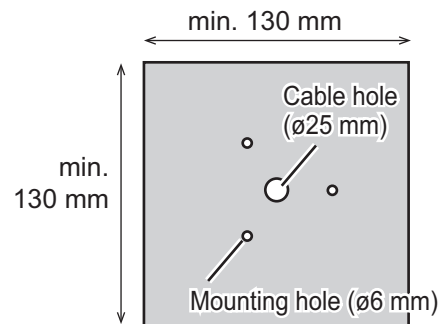
Name	Remarks
Electrical Drill	For making the mounting holes
Drill Bit	φ6
Hole Saw	For making the cable hole (φ25 mm)
File	For smoothing the cut edge of the cable hole
Phillips-head Screwdriver	#2
Self-vulcanizing tape	For waterproofing the connector
Vinyl tape	For waterproofing the connector

### 1.2.2 How to mount the Antenna Unit

- Construct a suitable mounting platform, minimum size 130 mm × 130 mm. If corrosive material is used, take necessary anti-corrosion measures.

**Note:** The mounting platform must be flat, level and firmly secured.

- Referring to the outline drawing at the back of this manual, drill three mounting holes (φ6 mm) and a cable hole for passing the supplied antenna in the mounting platform. The diameter of a cable hole is φ25±2 mm for SCX-20.

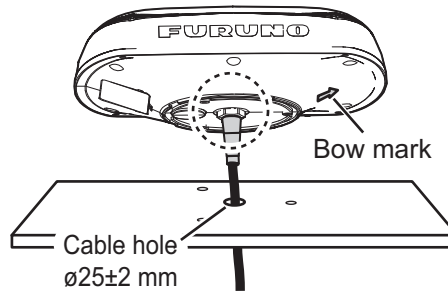


**Note:** Place the antenna unit on the platform, then orient the unit so the bow mark on its base is facing the ship's bow.

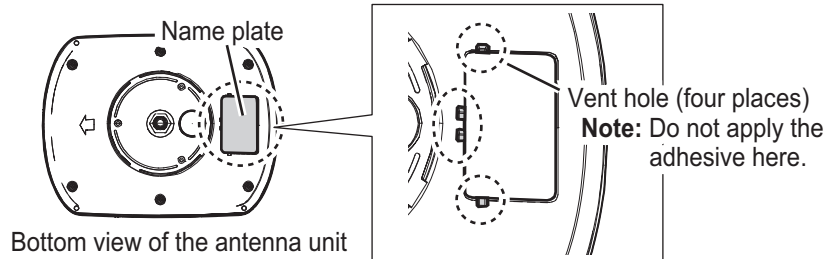


- Pass the antenna cable through the hole made at step 2 so the connector of the antenna cable exits on the upper side of the mounting platform.

4. Connect the antenna cable to the antenna unit connector.

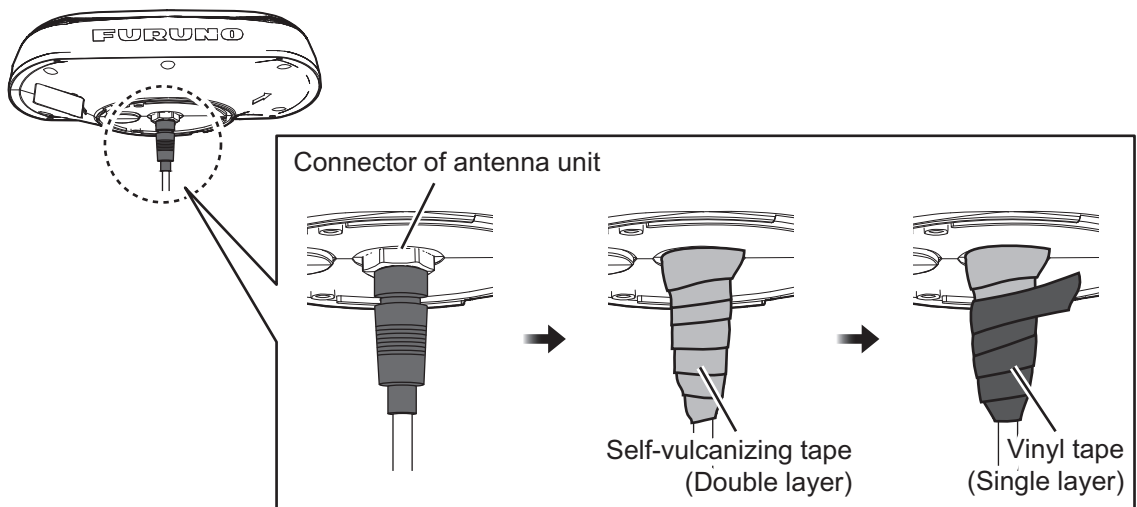


**Note:** DO NOT apply the supplied adhesive to the four vent holes near the name plate.



5. Wrap self-vulcanizing tape **twice** at the junction between connectors of the antenna unit and the antenna cable. Then wrap vinyl tape **once** over the self-vulcanizing tape for waterproofing.

**Note:** Wrap the tapes so as to cover both connectors of the antenna unit and the antenna cable.

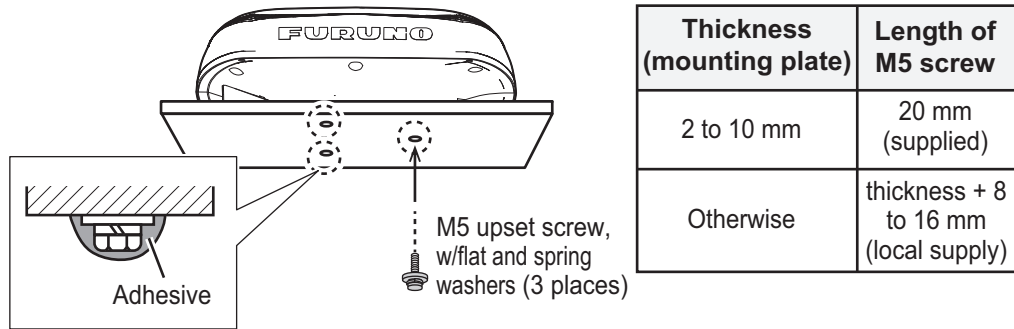


6. Adjust the direction of the antenna unit so the bow mark on its base is facing the ship's bow.

**Note:** When the antenna unit is placed on the platform, make sure that the platform is not inclined.

## 1. INSTALLATION

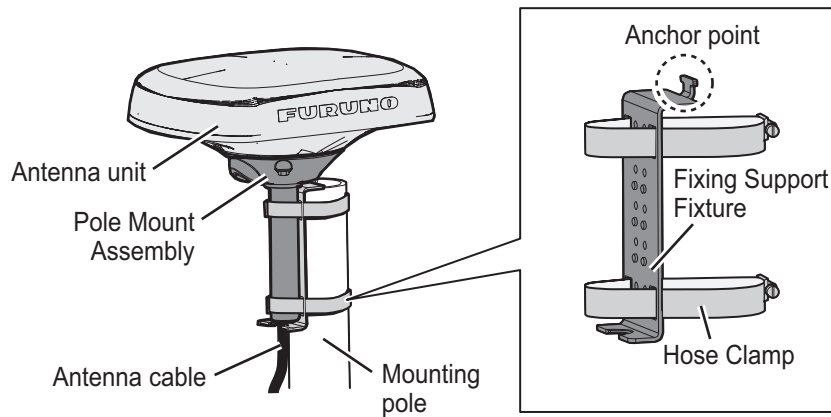
- Fasten the antenna unit to the mounting location with the three sets of supplied upset screws (M5×20, flat and spring washers attached) from the bottom through the mounting holes at step 2. After fastening the screws, coat the screw heads with the supplied adhesive.



**Note:** Screw length is dependent on the thickness of the mounting platform.

## 1.3 Pole Mount

Combine the antenna unit with the pole mount kit then attach the antenna unit assembly to the mounting pole.

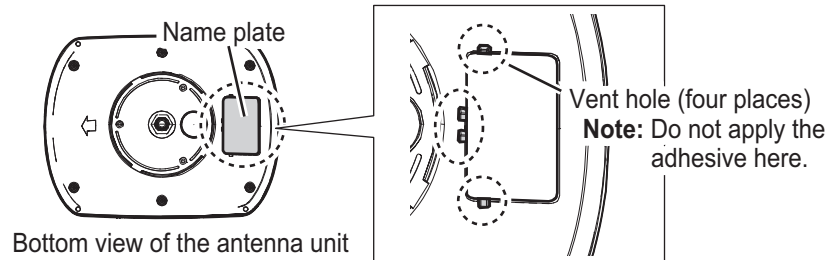


### 1.3.1 Installation notices

- The diameter of the mounting pole must be 25 to 50 mm.
- Use the **supplied** pole mount kit and the **supplied** fixing support fixture for the pole mount installation so that the bow mark of the antenna unit faces to the bow.
- Select the correct clamp size of the pole mount kit fixture considering the diameter of the mounting pole.

Name	Mast diameter	Remarks
Hose Clamp	For 20A to 25A (φ25 to 35 mm)	Standard supply with CP20-04603
	For 32A to 40A (φ35 to 50 mm)	Optional supply (OP20-52).

- DO NOT apply the supplied adhesive to the four vent holes near the name plate.



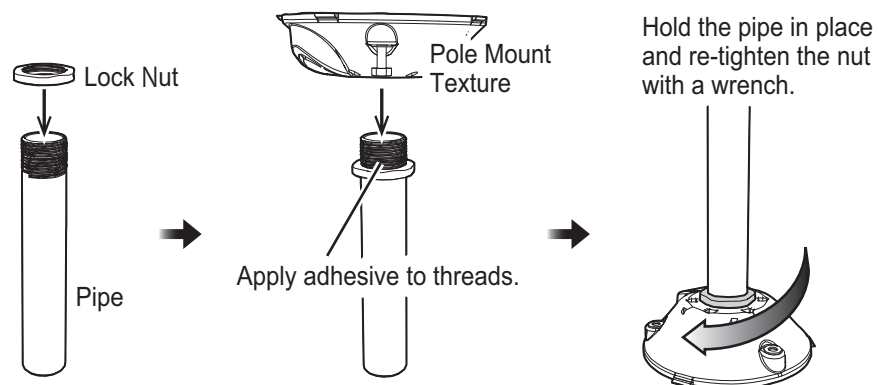
### 1.3.2 Required tools

The following tools should be prepared in advance for this installation.

Name	Remarks
Phillips-head Screwdriver	#2
Slotted Head Screwdriver	For clamp bolts.
Wrench	<ul style="list-style-type: none"> <li>• For fixing the lock nut (opposite side dist. 32 mm)</li> <li>• For fixing pole mount texture (opposite side dis. 8 mm))</li> </ul>
Cable tie	Two pieces (at least), for fixing the antenna cable.
Putty	For securing the cable entrance of the pipe.

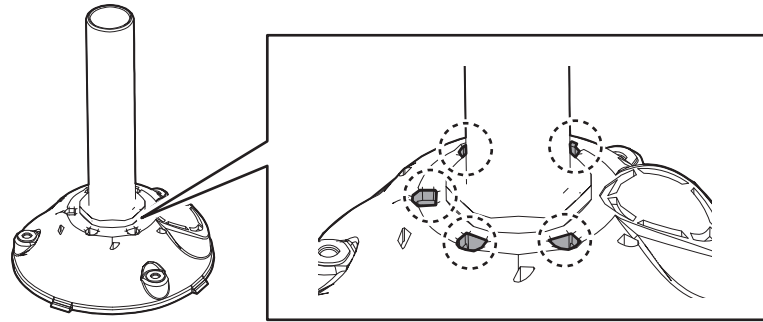
### 1.3.3 How to assemble the pole mount kit

1. Thread the supplied lock nut onto the supplied pipe then tighten to the end of thread as shown in the figure below.
2. Apply the adhesive around the threads of the pipe then attach the pole mount texture to the pipe.
3. Turn the assembly upside down, hold the pipe steady and tighten the lock nut again with a wrench. The torque must be 15 N•m.



4. Wipe off the excess adhesive.  
**Note:** Do not cover the five drain holes (shown in the figure below) with the adhesive.

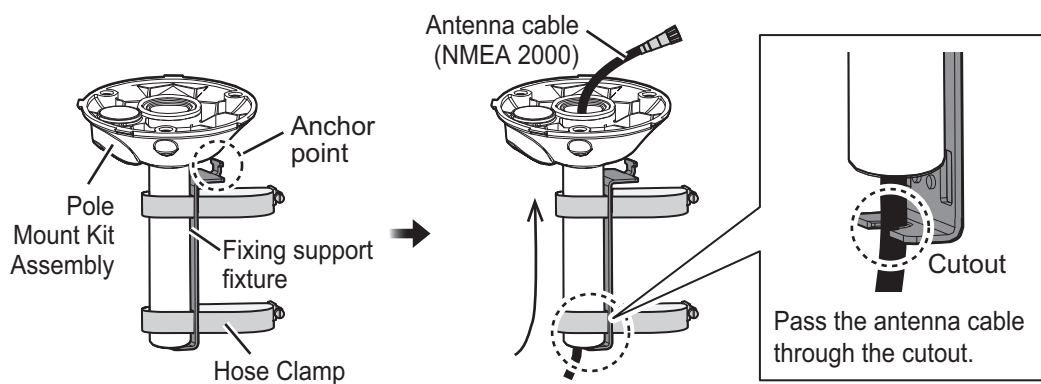
## 1. INSTALLATION



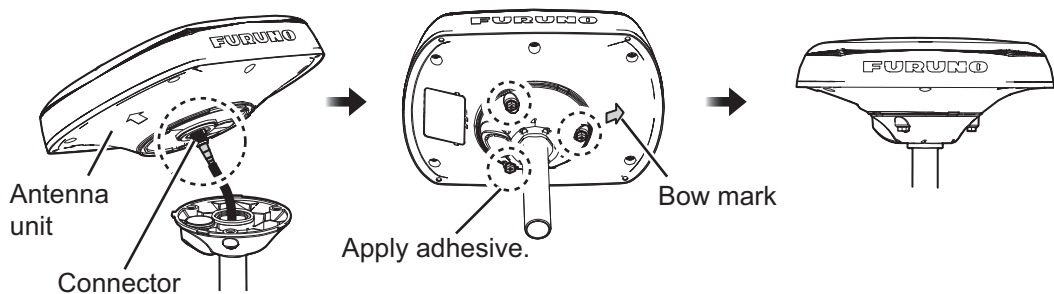
### 1.3.4 How to mount the Antenna Unit

1. Set the hose clamps on the pole mount kit assembly and pass the antenna cable for NMEA 2000 through the pipe of the mast mounting kit from the underside.

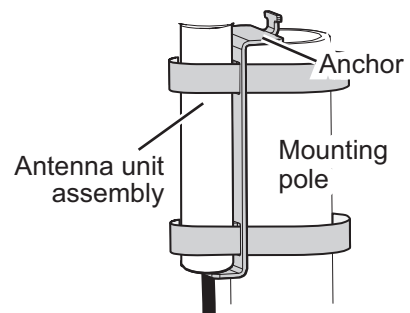
**Note:** Make sure the anchor point of the fixing support fixture faces upward.



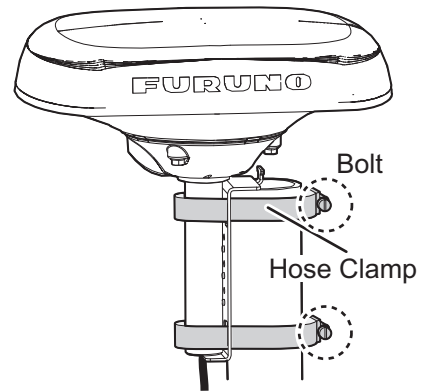
2. Connect the antenna cable for NMEA 2000 to the connector of the antenna unit. Secure the antenna unit with the three supplied M5 screws from the underside. After fixing screws, coat the screw heads with the supplied adhesive.



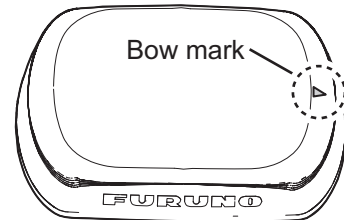
3. Set the antenna unit assembly to the mounting pole so that the anchor of the fixing support fixture is on the top of the mounting pole as shown in the figure at right.



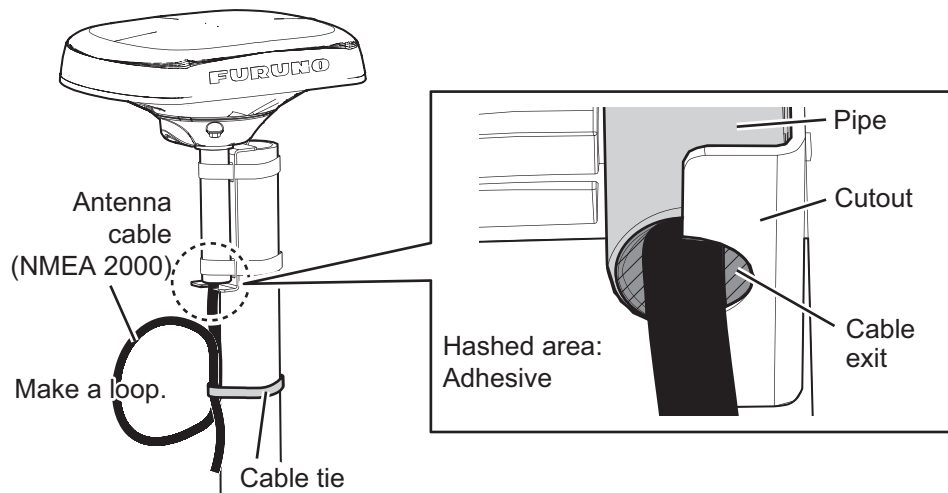
4. Loosely hand tighten the hose clamps so that you easily adjust the position of the antenna later in this procedure.



5. Adjust the direction of the antenna unit so the bow mark is facing the ship's bow.



6. Fasten the hose clamps to fix the antenna unit.
7. Make a loop in the antenna cable, then fix the looped section to the pole as shown in the figure below.



8. Apply putty (local supply) to the cable exit, to secure the cable.

## 1.4 Roof Mount

The optional Roof Mount Kit (OP20-04602) is used to mount the antenna unit on the roof (overhead), with the fixing screws inserted from the top of the antenna unit.

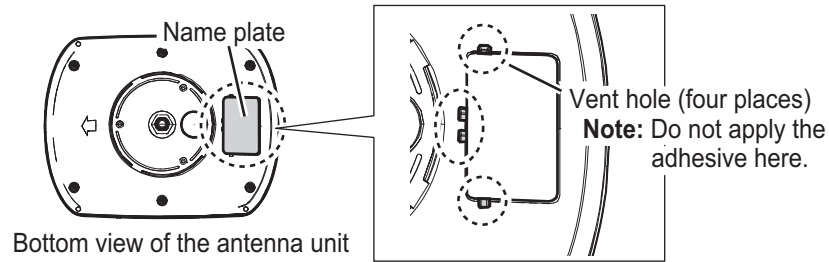
### 1.4.1 Installation notices

- The mounting platform must be flat. Do not install the unit on an uneven surface.
- DO NOT apply the adhesive to the area between the roof mount kit and the mounting platform, or between the antenna unit and the roof mount kit. See step 9 on page 1-10 for details.



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- DO NOT apply the adhesive to the four vent holes near the name plate.



### 1.4.2 Required tools

The following tools should be prepared in advance for this installation.

Name	Remarks
Hole Saw	For making the cable hole ( $\phi 25$ mm)
File	For smoothing the cut edge of the cable hole
Phillips-head Screwdriver	#2

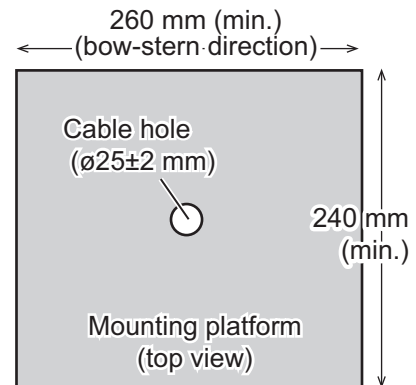
### 1.4.3 How to mount the Antenna Unit

1. Construct a suitable mounting platform, minimum size 260 mm (bow-stern)  $\times$  240 mm. If corrosive material is used, take necessary anti-corrosion measures.

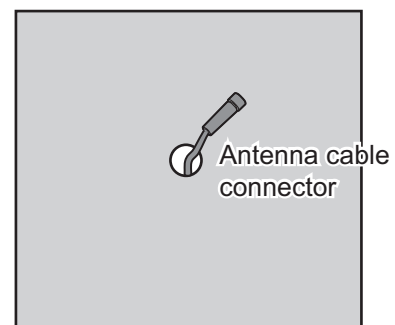
**Note:** The mounting platform must be flat, level and firmly secured.

2. Make a cable hole ( $\phi 25 \pm 2$  mm) for passing the supplied antenna cable through the center of the mounting platform.

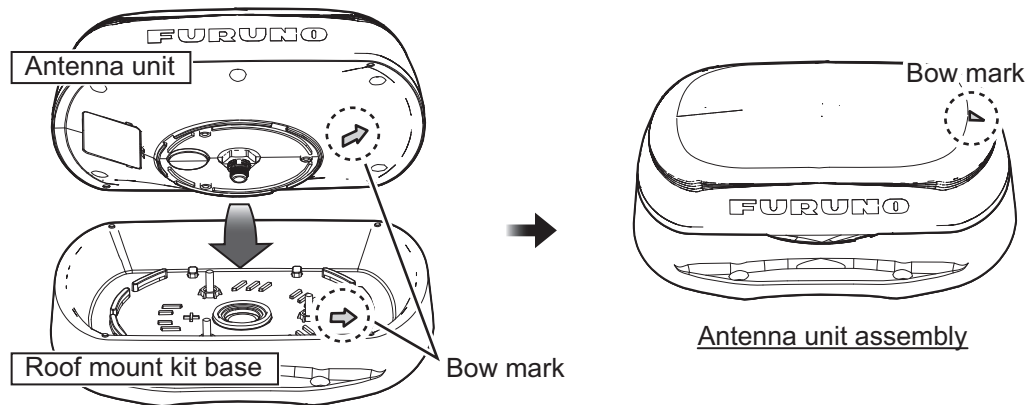
**Note:** The cable hole should be made according to the above specifications. An excessively large hole can result in water leakage. Alternatively, an excessively small hole can prevent cable routing.



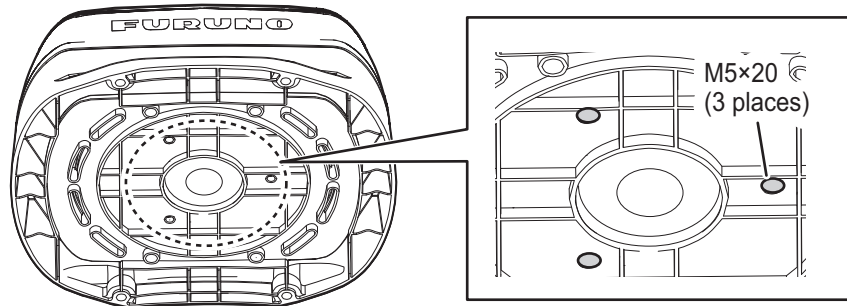
3. Pass the NMEA 2000 antenna cable through the hole made at step 2 so the connector of the antenna cable exits on the upper side of the mounting platform.



- Set the antenna unit on the roof mount kit so the bow marks for the antenna unit and the roof mount kit base are aligned.



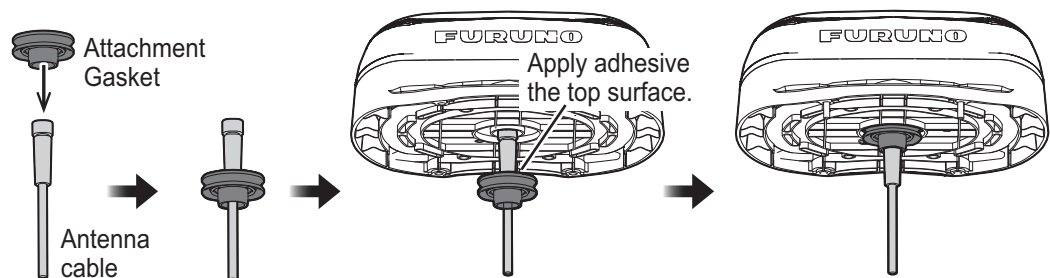
- Turn the antenna unit assembly upside-down, then secure the antenna unit to the kit base with the supplied three screws (M5×20).



- Attach the supplied attachment gasket to the antenna cable. Apply the supplied adhesive to top of the attachment gasket and then connect the antenna cable to the bottom of the antenna unit assembly.

**Note 1:** When attaching the gasket to the antenna cable, take note of the direction of the gasket referring to the figure below.

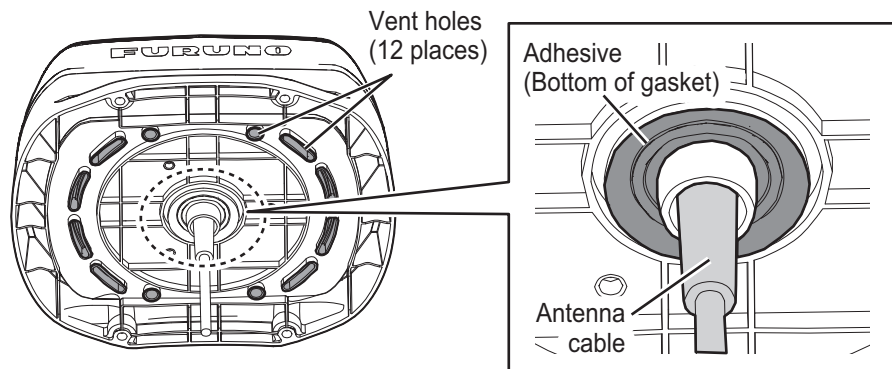
**Note 2:** Before attaching the gasket to the antenna unit, apply the supplied adhesive (TB5211) to the top surface of the gasket, where it contacts the antenna unit.



## 1. INSTALLATION

7. Apply the supplied adhesive (TB5211) to the bottom of the attachment gasket.

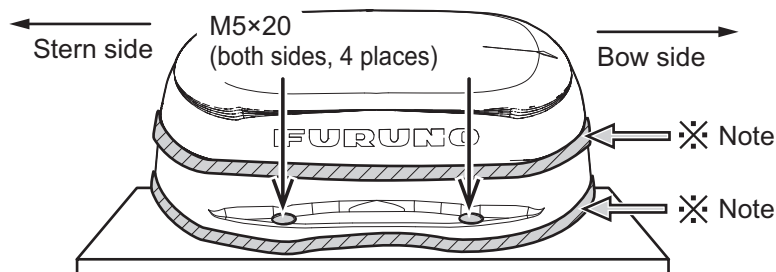
**Note:** DO NOT apply the adhesive to the vent holes.



8. Set the antenna unit assembly so the bow mark (see step 4) on the top of the antenna unit is facing the ship's bow.

9. Apply the supplied adhesive TB5211 to the threads of the supplied screws (M5×20), then fasten the antenna unit assembly with their screws from the top.

**Note:** DO NOT apply the adhesive to the contact areas (Hashed areas in the figure below) between the roof mount kit and a mounting platform and between the antenna unit and the roof mount kit.



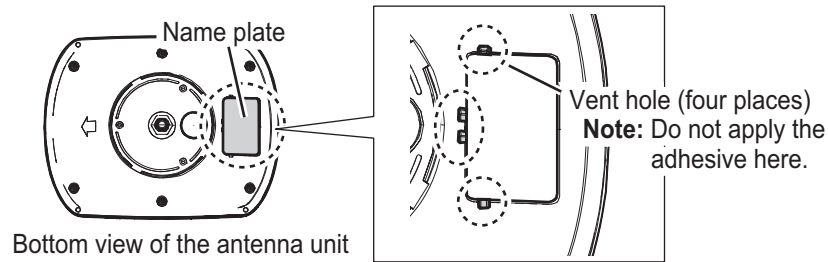
### 1.5 Antenna Mounting Base (option)

The antenna unit can be mounted on the following locations, using the optional right angle mounting base (NO.13-QA330).

- Inclined surface (adjustable up to 35°)
- Narrow, flat surface

### 1.5.1 Installation notices

- Do not install the unit on an uneven surface.
- DO NOT apply the adhesive to the four vent holes near the name plate.



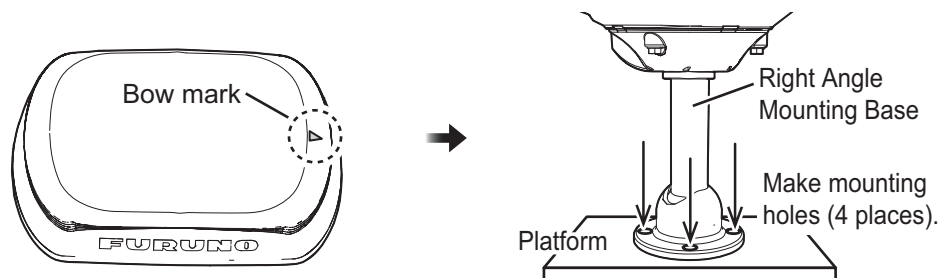
### 1.5.2 Required tools

The following tools should be prepared in advance for this installation.

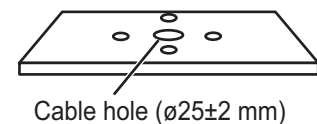
Name	Remarks
Electrical Drill	For making the mounting holes
Drill Bit	$\phi 4.2$ to 5
Hole Saw	For making the cable hole ( $\phi 25$ mm)
File	For smoothing the cut edge of the cable hole
Phillips-head Screwdriver	#2

### 1.5.3 How to mount the Antenna Unit

1. Attach the pole mount kit to the antenna base referring to subsection 1.3.3.  
**Note:** The pipe included in the pole mount kit is not used.
2. Set the antenna base to the mounting location considering the tilt direction, and make four mounting holes ( $\phi 4.2$  to 5 mm) on the mounting platform.  
**Note:** The possible tilt direction of the antenna base depends on the setting position of the antenna base.

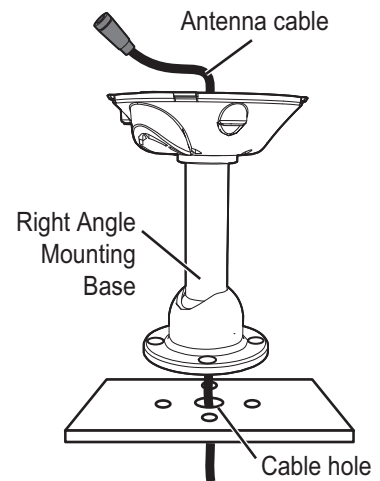


3. Make an antenna cable hole ( $\phi 25 \pm 2$  mm) at the center of the four mounting holes for passing the supplied NMEA 2000 antenna cable through the mounting platform.

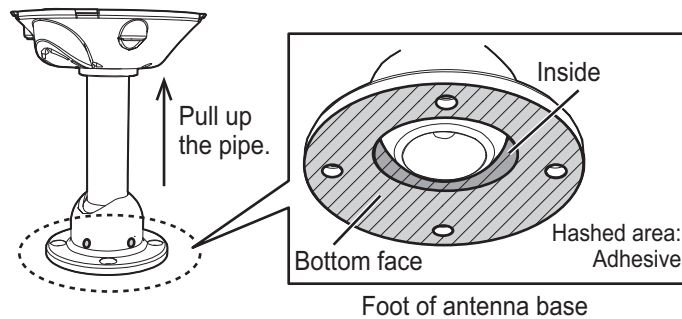


## 1. INSTALLATION

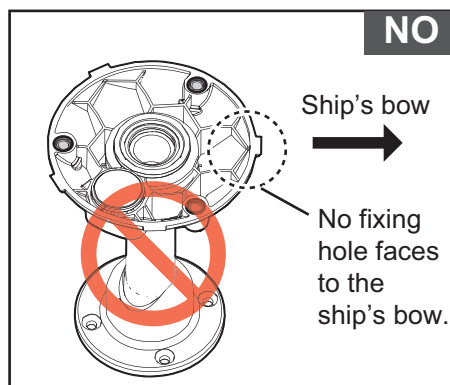
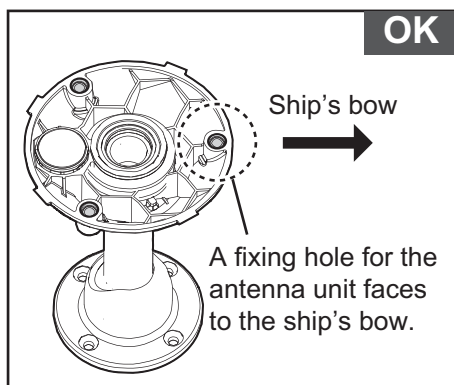
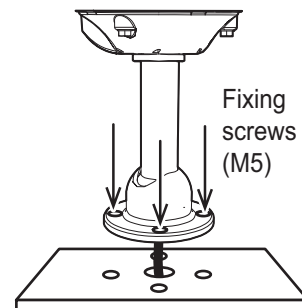
4. Pass the NMEA 2000 antenna cable through the mounting platform and the pipe of the antenna base from the underside of the antenna base.



5. Pull the pipe slightly upwards then apply the supplied adhesive to the inside and bottom face the antenna base footing.

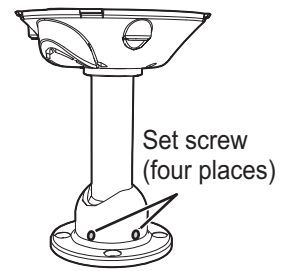


6. Fit the antenna base to the platform so that the mounting holes are aligned with each other. Adjust the direction of the pipe while keeping in mind the fixing hole is pointed towards the ship's bow as illustrated below.



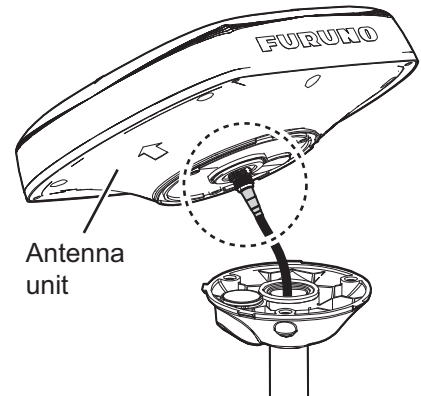
## 1. INSTALLATION

- Remove hex socket head bolts one by one and fasten the supplied screws with adhesive loosely. After loosely fastening four screws, fasten them tightly then wipe off the excess adhesive.  
**Note:** The adhesive takes approximately 30 minutes to adhere.

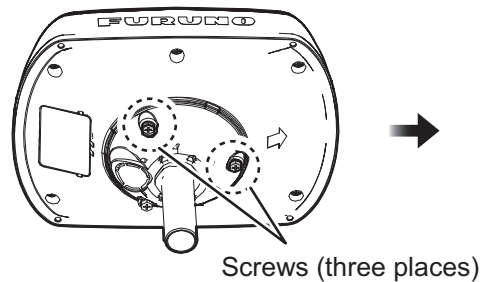


Antenna base

- Connect the NMEA 2000 antenna cable to the bottom of the antenna unit.



- Secure the antenna unit with the supplied three M5 screws from the underside.



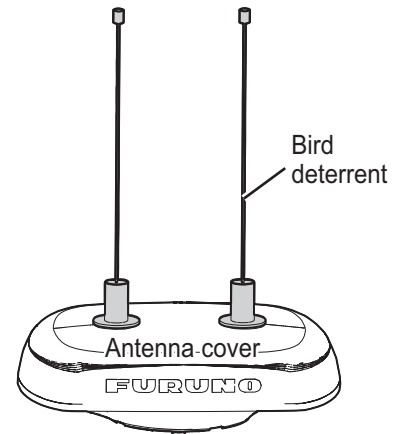
- Loosen the hex socket head bolts (see step 5) with the supplied hex key wrench then adjust the direction of antenna base so the bow mark on its base is facing the ship's bow. After adjusting, tighten the hex socket head bolts on the antenna base again.



## 1.6 Bird Deterrents (Option)

The optional bird deterrents (OP20-54) can help keep birds from resting on your antenna.

Remove the double-sided tape from two bird deterrents, then attach the deterrents to the antenna cover. Coat around the contact area of both bird deterrents with the supplied adhesive.



## 1.7 Snow Cover Kit (Option)

The optional Snow Cover Kit (OP20-53) is available to reduce snow build-up on your antenna.

To install this kit, see the instructions (C72-01901) supplied with the kit.

## 1.8 Wiring with Other Equipment

Using the supplied cable assembly, connect the antenna cable of this equipment to the NMEA 2000 network backbone. Refer to "SYSTEM CONFIGURATION" on page vi for details.

This equipment connects to the devices in an NMEA 2000 network.

- This equipment: 4 LEN at 9 V
- Connect equipment to the backbone with T-type connectors.
- Terminators are required for both ends of the backbone cable.
- We recommended that power from the NMEA 2000 network be input at the center of the backbone.

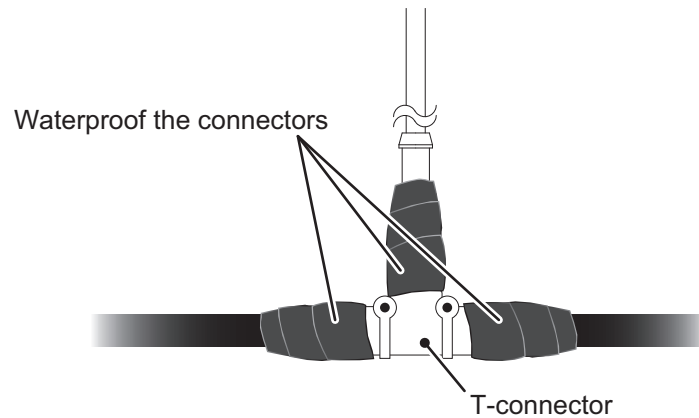
### **What is NMEA 2000 (CAN) bus?**

CAN bus is a communication protocol (NMEA 2000 compliant) that shares multiple data and signals through a single backbone cable. You can simply connect any CAN bus devices onto the backbone cable to expand your network on-board. With CAN bus, IDs are assigned to all the devices in the network, and the status of each sensor in the network can be detected. All the CAN bus devices can be incorporated into the CAN bus network. For detailed information about CAN bus wiring, see "Furuno CAN bus Network Design Guide" (Type: TIE-00170).

**Guideline for Connecting**

Follow these guidelines when selecting a mounting location.

- Where the cable connectors and NMEA 2000 connectors are subjected to moisture or water spray, waterproof the connectors as shown below.
  1. Wrap the connection point with a single layer of vinyl tape.
  2. Wrap one layer of self-bonding tape over the vinyl tape.
  3. Wrap two layers of vinyl tape over the self-bonding tape.





## 1. INSTALLATION

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## 2. INITIAL SETTINGS

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When the unit is powered for the first time, it is in a “cold start” state, meaning there is no satellite data (almanac data) stored. In this state, the unit searches for, and stores, satellites to find its heading. This process takes approximately 60 seconds.

If the heading is not found within 30 minutes, the antenna installation location may not be suitable. Ensure an unobstructed path between the SCX-20 and satellites. Once a heading has been found, initial settings should be done.

If the installed heading error is found to be 5° or higher, physically turn the antenna while monitoring the heading indication to reduce the error as much as possible. Errors less than 5° can be adjusted in software.

Initial settings can be done via the NMEA 2000 network with one of the following methods:

- Access the setting menu of the SCX-20 from compatible equipment
  - TZTL12F/TZTL15F/TZT2BB: Software version must be “06.01” or later.
  - NAVpilot-300: Software version of the control unit must be “01.07” or later, and software version of the processor unit must be “01.06” or later.
  - TZT12F/TZT16F/TZT19F

See the operator’s manual of the equipment used to access the SCX-20 for how to access the setting menu.

- Connect a PC and setup the SCX-20 using the SC setting tool

You can download the SC setting tool from the quick response code to the right. For how to use the SC setting tool, see the operator’s manual of the SC setting tool (OME-72851).



**Note 1:** If the SCX-20 is re-booted, re-connection is required to access the SCX-20 menu.

**Note 2:** This manual provides descriptions for the SCX-20 setting menu that you can access from the compatible equipment. See the menu tree at the back of this manual for menu details.

**Note 3:** This manual uses the TZTL15F for menu examples and screenshots. Displayed data, menus and layouts may differ on your equipment.

## 2.1 [GNSS Setup] Menu

You can disable (ignore) satellites and adjust the elevation mask from the [GNSS Setup] menu.

Menu item	Description
[Disable SV]	
[QZSS All]	Select [YES] to ignore all QZSS system satellites.
[QZSS] → [QZSS1]	You can ignore individual QZSS system satellites by specifying the satellite number. A maximum of three satellites can be ignored. <b>Note:</b> When [QZSS All] is set to [YES], the setting values for [QZSS1] to [QZSS3] are automatically changed to "0".
[QZSS] → [QZSS2]	
[QZSS] → [QZSS3]	
[GPS All]	Select [YES] to ignore all GPS system satellites.
[GPS] → [GPS1]	You can ignore individual GPS system satellites by specifying the satellite number. A maximum of three satellites can be ignored. <b>Note:</b> When [GPS All] is set to [YES], the setting values for [GPS1] to [GPS3] are automatically changed to "0".
[GPS] → [GPS2]	
[GPS] → [GPS3]	
[GLONASS All]	Select [YES] to ignore all GLONASS system satellites.
[GLONASS] → [GLONASS1]	You can ignore individual GLONASS system satellites by specifying the satellite number. A maximum of three satellites can be ignored. <b>Note:</b> When [GLONASS All] is set to [YES], the setting values for [GLONASS1] to [GLONASS3] are automatically changed to "0".
[GLONASS] → [GLONASS2]	
[GLONASS] → [GLONASS3]	
[Galileo All]	Select [YES] to ignore all Galileo system satellites.
[Galileo] → [Galileo1]	You can ignore individual Galileo system satellites by specifying the satellite number. A maximum of three satellites can be ignored. <b>Note:</b> When [Galileo All] is set to [YES], the setting values for [Galileo1] to [Galileo3] are automatically changed to "0".
[Galileo] → [Galileo2]	
[Galileo] → [Galileo3]	
[SV ELEV]	
[SV ELEV]	Adjust the elevation mask angle. This equipment does not track satellites with an elevation angle lower than the angle set here. A higher elevation mask angle increases the positioning accuracy, but the number of the available satellites may be decreased and equipment may not be able to obtain an accurate position fix.
[SBAS]	
[SBAS Mode]	Enable/disable the use of the SBAS system.
[SBAS Search]	Select [Auto] to search automatically for SBAS satellites, or [Manual] to manually input the SBAS satellite number.
[SBAS Satellite Selection]	Manually input the SBAS satellite number(s) you want to use. <b>Note:</b> This item is only available when SBAS Search is set to Manual.
[Disable SBAS]	Select up to three SBAS satellites to ignore.
[Disable SBAS] → [SBAS1]	You can ignore SBAS satellites by specifying the satellite number. A maximum of three satellites can be ignored.
[Disable SBAS] → [SBAS2]	
[Disable SBAS] → [SBAS3]	

## 2.2 [Sensor] Menu

In order to display data correctly, enter the ship's dimensions, SCX-20 installation location and adjust the sensor offset values as required on the [Sensor] menu.

Menu item	Description
[Offset]	
[HDG]	Offset the heading angle. When the heading angle is skewed right, enter a negative value. When the heading angle is skewed left, enter a positive value.
[Pitch]	Offset the pitch angle.
[Roll]	Offset the roll angle.
[SOG/3-Axis Speed]	Offset the speed value.
[Air Pressure]	Offset the air pressure value.
[Air Temperature]	Offset the air temperature value.
[Smoothing]	
[SOG/COG]	Set the time delay (smoothing) for SOG/COG data output.
[3-Axis Speed]	Set the time delay (smoothing) for 3-Axis Speed data output.
[ROT]	Set the time delay (smoothing) for ROT data output.
[DR Time]	
[DR Time]	When the SCX-20 cannot receive the signal from the satellite, the SCX-20 continues to output heading data as "dead reckoning" for the time set here. If the signal from the satellite cannot be retrieved within the time set here, the SCX-20 stops outputting the heading data.
[Ship Size, ANT/CALC-SPD Position]	
<p>Enter the appropriate value according to the ship's size, <b>to improve the accuracy of the 3-axis speed</b>. The reference position for installation location and calculating position of the 3-axis speed is shown in the following figure:</p>	
[Ship's Width]	Set the ship's width, calculated from the port-side to starboard-side of the widest section of the vessel (Setting range: 1.0 to 999.9 m).
[Ship's Length]	Set the ship's length, calculated to the bow-tip to the stern, along the center of the vessel (Setting range: 1.0 to 999.9 m).
[Ship's Height]	Set the ship's height, calculated to the bottom of the keel to the top of the mast (Setting range: 1.0 to 199.9 m).

## 2. INITIAL SETTINGS

Menu item	Description
[ANT Position X0]	Set the port-starboard (Lateral) location of the SCX-20. Enter negative value for port-side, positive value for starboard-side. The center of the vessel is "0" (Setting range: -327.64 to +327.64 m).
[ANT Position Y0]	Set the bow-stern (Longitudinal) location of the SCX-20. Set the distance from the bow to the stern with the bow as 0 m (Setting range: 0.0 to 999.9 m).
[ANT Position Z0]	Set height of the SCX-20, from the bottom of the ship (Setting range: 0.0 to 199.9 m).
[CALC-SPD- POSN Y1 (BOW)]	Set the bow-stern location for calculating the 3-axis speed. Ship's speed can be measured at two locations in addition to the antenna position. Enter the backward distance from the reference position (Fwd Center of the bow) to the position where you want to measure the ship's speed. Normally, keep the default settings. <b>Note:</b> The value for [CALC-SPD-Y1] is set to [0 m] as default. [CALC-SPD-Y2] is automatically set to the ship's length (set previously, in the same menu). For most vessels, these two settings do not require adjustment. On large vessels, where speed and location is required at locations other than the bow, such as for docking, these two values should be adjusted as required. For all vessels, [CALC-SPD-Z] should be set to the vessel's draft value. For further information, contact your local FURUNO dealer.
[CALC-SPD- POSN Y2 (Stern)]	
[CALC-SPD- POSN Z (Height)]	Set the height for calculating the 3-axis speed. Enter the distance from the bottom of the ship to the position where you want to measure the ship's speed. For example, enter the draft value when you want to measure the speed at draft position.

## 2.3 [Input/Output] Menu

You can enable/disable PGN output from the SCX-20 and adjust transmission rate on the [Input/Output] menu.

The following table shows the PGNs that the SCX-20 outputs and transmission rate is adjustable. If you want to disable the PGN, set the transmission rate to "Off". The setting range changes according to the PGN. For the setting range of each PGN, see the menu tree at the back of this manual.

**Note:** Normally, keep the default setting. If there is a need to change the transmission rate, only change the rate for necessary PGNs. An excessive number of PGNs with a low transmission rate can cause problems with PGN output and transmission rates.

PGN	PGN name	PGN	PGN name
065280	Heave	129540	GNSS Sats in View
126992	System Time	130310	Environmental Parameters
126993	Heartbeat	130312	Temperature
127250	Vessel Heading	130314	Actual Pressure
127251	Rate of Turn	130316	Temperature, Extended Range
127252	Heave	130577	Direction Data
127257	Attitude	130578	Vessel Speed Components
127258	Magnetic Variation	130842	Six Degrees of Freedom Movement
129025	Position, Rapid Update	130843	Heel Angle and Roll Information

PGN	PGN name	PGN	PGN name
129026	COG and SOG, Rapid Update	130845	Multi Sats In View Extended
129029	GNSS Position Data	130846	Motion Sensor Status Extended
129539	GNSS DOPs		

## 2.4 [System] Menu

You can check the system information, perform diagnostic tests and restore the factory defaults from the [System] menu.

Menu item	Description
[System Information]	
[Main PCB]	Main board version.
[Starter Version]	Starter application software version.
[Booter 1 Version]	Booter 1 application software version.
[Booter 2 Version]	Booter 2 application software version.
[Application Version]	Main application software version.
[Serial No.]	Serial number for your SCX-20.
[GNSS 1]	GNSS cores (1 to 4) software version.
[GNSS 2]	
[GNSS 3]	
[GNSS 4]	
[CAN Unique Number]	CAN unique ID for the SCX-20.
[CAN Address]	CAN address assigned to the SCX-20.
[Powered Time]	Time since the SCX-20 was last turned on.
[Overall Powered Time]	Total operation time of the SCX-20.
[Simple Diagnostic Test]	
[ROM]	ROM test result (OK or NG (No Good)).
[RAM]	RAM test result (OK or NG (No Good)).
[Rate Gyro Status]	Rate gyro status (Good or Bad).
[Accelerometer Status]	Accelerometer status (Good or Bad).
[Magnetic Sensor Status]	Magnetic sensor status (Good or Bad).
[Press./Temp. Sensor Status]	Air pressure/temperature sensor status (Good or Bad).
[Installation Status]	Show the number of excessive vibrations detected at the installation location.

## 2. INITIAL SETTINGS

Menu item	Description	
[GNSS 1 Status]	GNSS 1 thru 4 status (Good or Bad).	
[GNSS 2 Status]		
[GNSS 3 Status]		
[GNSS 4 Status]		
[Antenna 1 Status]	Antenna 1 thru 4 status (Good or Bad).	
[Antenna 2 Status]		
[Antenna 3 Status]		
[Antenna 4 Status]		
[Advanced Diagnostic Test]		
[ROM]	Shows the test results for each item (OK or NG (No Good)). <b>Note:</b> This test automatically checks each item and data output stops during the test.	
[RAM]		
[Rate Gyro Test]		
[Accelerometer Test]		
[GNSS 1 RAM Test]		
[GNSS 1 ROM Test]		
[GNSS 2 RAM Test]		
[GNSS 2 ROM Test]		
[GNSS 3 RAM Test]		
[GNSS 3 ROM Test]		
[GNSS 4 RAM Test]		
[GNSS 4 ROM Test]		
[Reset Setting]		
[Menu Settings]	Select [YES] to restore all user set menu settings to their default. Reboot the SCX-20 to complete the procedure.	<b>Note:</b> Almanac data is also reset with this procedure, correct positioning will not be available until sufficient satellite data is re-obtained.
[Factory Reset]	Select [YES] to restore the SCX-20 to factory default. Reboot the SCX-20 to complete the procedure.	
[Restart]		
[System Restart]	Select [YES] to restart the SCX-20. <b>Note:</b> All data output from the SCX-20 stops when [YES] is selected. This procedure should only be done when safely moored.	

# 3. MAINTENANCE

## 3.1 Preventative Maintenance

The following preventative maintenance and checks are important for good performance.

Item to check	Points to check	Remedy
Connectors	Check that the connectors are firmly connected.	Reconnect loosened cables.
Cable run (cabling)	Visually check the cables for wear and tear or damage.	Consult your dealer for cable replacement.
Cover	Cleanliness of the cover	Dust can be removed with a soft cloth. Do not use chemical-based cleaners or solvents as they can remove paint/markings and cause the cover to deform.

## 3.2 Troubleshooting

This section covers possible problems which may arise while using the SCX-20 and how to address each problem.

Problem	Possible cause	Remedy
Data is not received from the SCX-20.	Cable is disconnected, damaged, or faulty.	Check the SCX-20 cable connectors are firmly connected. Check that the cable is not damaged or severed. Also confirm that the CAN bus is powered and functioning normally. Contact your local dealer for service as required.
	Incorrect settings at the display.	Refer to the Multi-Function Display unit's manual and adjust the settings as required.
Data (heading, etc.) shown on the screen is not correct.	<ul style="list-style-type: none"> <li>Offsets not applied at installation, or not applied correctly.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the antenna location is proper.</li> <li>Check the incorrect item against other equipment by sight. Adjust the offsets as required.</li> </ul>
Position data is not received.	GLONASS is set for ANT 4.	GLONASS is NOT applied to ANT4. For GLONASS, select ANT1 to ANT3.

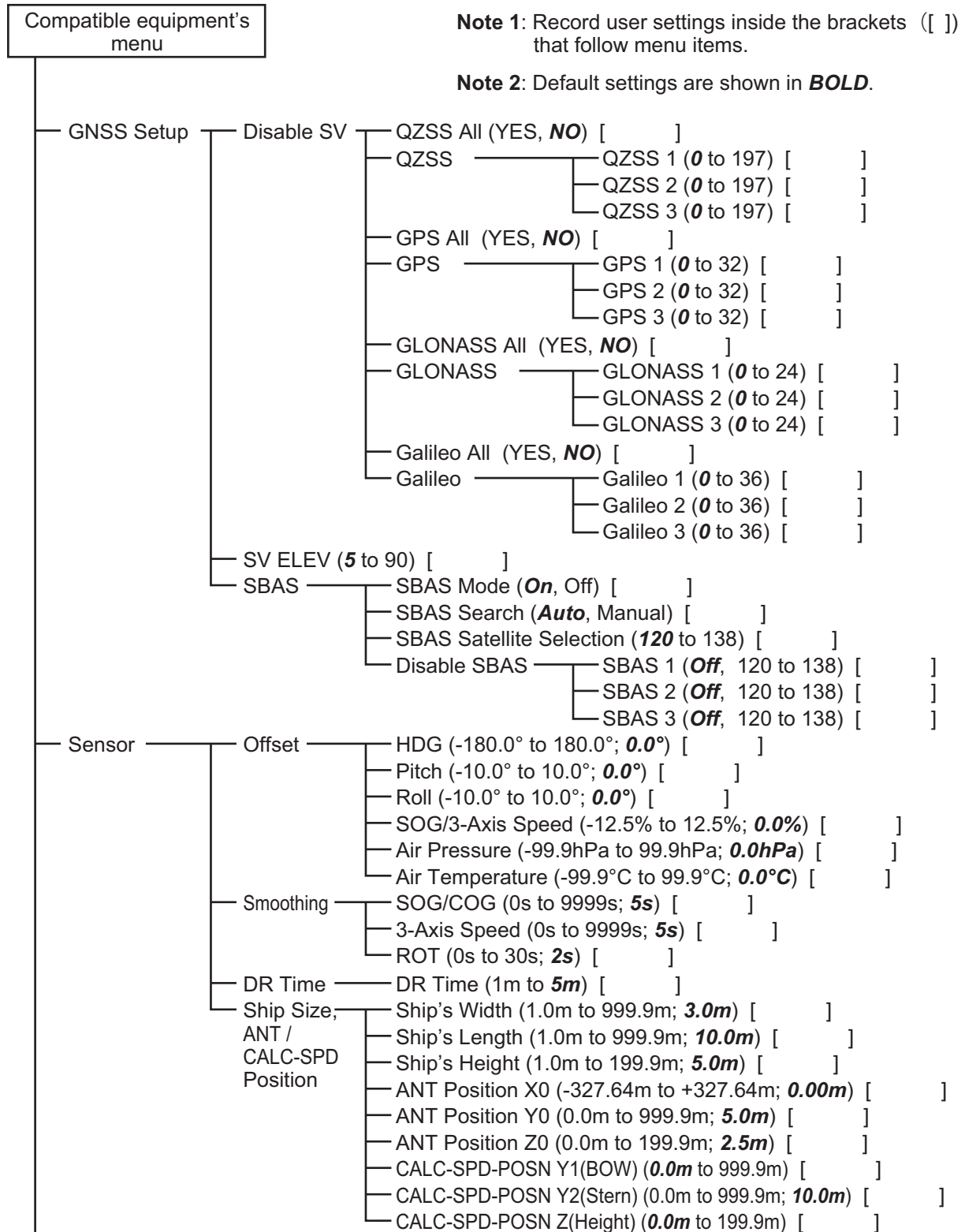


### 3. MAINTENANCE

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# APPENDIX 1 MENU TREE

This appendix covers the SCX-20 menu, accessible from compatible equipment. For the SC setting tool menu tree, see the operator's manual for the SC setting tool (OME-72851). Contact our dealer for details.



① **Continued from the previous page**

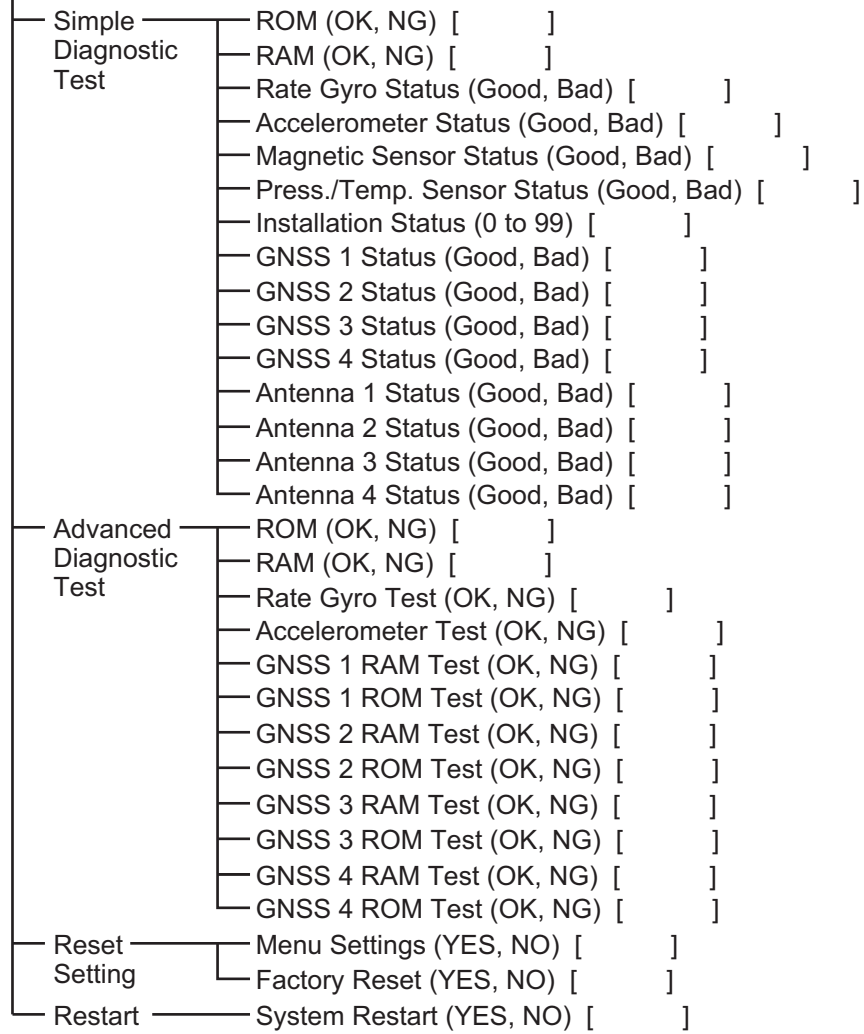
- Input/Output — PGN\*
  - 065280 (Off, 20, 25, 50, **100**, 200, 1000, 2000) [ ]
  - 126992 (Off, **1000**, 2000) [ ]
  - 126993 (Off, **60000**) [ ]
  - 127250 (Off, 20, 25, 50, **100**, 200, 1000, 2000) [ ]
  - 127251 (Off, 20, 25, 50, **100**, 200, 1000, 2000) [ ]
  - 127252 (Off, 20, 25, 50, **100**, 200, 1000, 2000) [ ]
  - 127257 (Off, 20, 25, 50, **100**, 200, 1000, 2000) [ ]
  - 127258 (Off, **1000**, 2000) [ ]
  - 129025 (Off, **100**, 200, 1000, 2000) [ ]
  - 129026 (Off, 200, **250**, 1000, 2000) [ ]
  - 129029 (Off, **1000**, 2000) [ ]
  - 129539 (Off, **1000**, 2000) [ ]
  - 129540 (Off, **1000**, 2000) [ ]
  - 130310 (Off, **500**, 1000, 2000) [ ]
  - 130312 (Off, 500, **1000**) [ ]
  - 130314 (Off, 1000, **2000**) [ ]
  - 130316 (Off, 1000, **2000**) [ ]
  - 130577 (Off, 20, 25, 50, 100, 200, **1000**, 2000) [ ]
  - 130578 (Off, 200, **250**, 1000, 2000) [ ]
  - 130842 (Off, 20, 25, 50, **100**, 200) [ ]
  - 130843 (Off, 20, 25, 50, **100**, 200) [ ]
  - 130845 (Off, **1000**) [ ]
  - 130846 (Off, **1000**) [ ]

\*: PGN settings use milliseconds (ms) as their unit of measurement.

- System — System Information
  - Main PCB (Display only) [ ]
  - Starter Version (Display only) [ ]
  - Booter1 Version (Display only) [ ]
  - Booter2 Version (Display only) [ ]
  - Application Version (Display only) [ ]
  - Serial No. (Display only) [ ]
  - GNSS 1 (Display only) [ ]
  - GNSS 2 (Display only) [ ]
  - GNSS 3 (Display only) [ ]
  - GNSS 4 (Display only) [ ]
  - CAN Unique Number (Display only) [ ]
  - CAN Address (Display only) [ ]
  - Powered Time (Display only) [ ]
  - Overall Powered Time (Display only) [ ]

② **Continued on the following page**

**2** Continued from the previous page



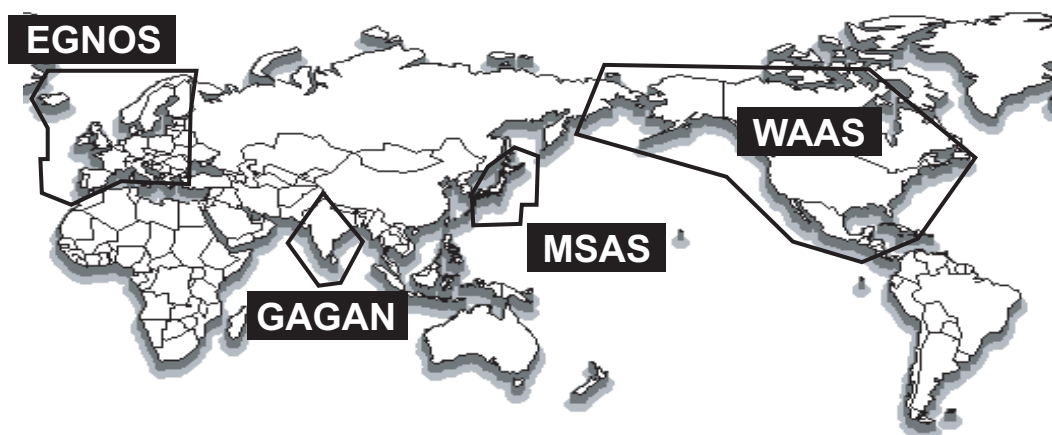
# APPENDIX 2 GEODETIC CHART CODES

001: WGS84		091: NORTH AMERICAN 1927	: Bahamas (excl. San Salvador Is.)
002: WGS72		092: NORTH AMERICAN 1927	: Bahamas, San Salvador Is.
003: TOKYO	: Mean Value (Japan, Korea & Okinawa)	093: NORTH AMERICAN 1927 (Cont'd)	: Canada (incl. Newfoundland Is.)
004: NORTH AMERICAN 1927	: Mean Value (CONUS)	094: NORTH AMERICAN 1927 (Cont'd)	: Alberta & British Columbia
005: EUROPEAN 1950	: Mean Value	095: NORTH AMERICAN 1927 (Cont'd)	: East Canada
006: AUSTRALIAN GEODETIC 1984	: Australia & Tasmania	096: NORTH AMERICAN 1927 (Cont'd)	: Manitoba & Ontario
007: ADINDAN	: Mean Value (Ethiopia & Sudan)	097: NORTH AMERICAN 1927 (Cont'd)	: Northwest Territories & Saskatchewan
008: ADINDAN	: Ethiopia	098: NORTH AMERICAN 1927 (Cont'd)	: Yukon
009: ADINDAN	: Mali	099: NORTH AMERICAN 1927 (Cont'd)	: Canal Zone
010: ADINDAN	: Senegal	100: NORTH AMERICAN 1927 (Cont'd)	: Caribbean
011: ADINDAN	: Sudan	101: NORTH AMERICAN 1927 (Cont'd)	: Central America
012: AFG	: Somalia	102: NORTH AMERICAN 1927 (Cont'd)	: Cuba
013: AIN EL ABD 1970	: Bahrain Is.	103: NORTH AMERICAN 1927 (Cont'd)	: Greenland
014: ANNA 1 ASTRO 1965	: Cocos Is.	104: NORTH AMERICAN 1927 (Cont'd)	: Mexico
015: ARC 1950	: Mean Value	105: NORTH AMERICAN 1983	: Alaska
016: ARC 1950	: Botswana	106: NORTH AMERICAN 1983	: Canada
017: ARC 1950	: Lesotho	107: NORTH AMERICAN 1983	: CONUS
018: ARC 1950	: Malawi	108: NORTH AMERICAN 1983	: Mexico, Central America
019: ARC 1950	: Swaziland	109: OBSERVATORIO 1966	: Corvo & Flores Is. (Azores)
020: ARC 1950	: Zaire	110: OLD EGYPTIAN 1930	: Egypt
021: ARC 1950	: Zambia	111: OLD HAWAIIAN	: Mean Value
022: ARC 1950	: Zimbabwe	112: OLD HAWAIIAN	: Hawaii
023: ARC 1960	: Mean Value (Kenya & Tanzania)	113: OLD HAWAIIAN	: Kauai
024: ARC 1960	: Kenya	114: OLD HAWAIIAN	: Maui
025: ARC 1960	: Tanzania	115: OLD HAWAIIAN	: Oahu
026: ASCENSION IS. 1958	: Ascension Is.	116: OMAN	: Oman
027: ASTRO BEACON "E"	: Iwo Jima Is.	117: ORDANCE SURVEY OF GREAT BRITAIN 1936	: Mean Value
028: ASTRO B4 SOR. ATOLL	: Tern Is.	118: ORDANCE SURVEY OF GREAT BRITAIN 1936	: England
029: ASTRO POS 71/4	: St. Helena Is.	119: ORDANCE SURVEY OF GREAT BRITAIN 1936	: England, Isle of Man & Wales
030: ASTRONOMIC STATION 1952	: Marcus Is.	120: ORDANCE SURVEY OF GREAT BRITAIN 1936	: Scotland & Shetland Is.
031: AUSTRALIAN GEODETIC 1966	: Australia & Tasmania	121: ORDANCE SURVEY OF GREAT BRITAIN 1936	: Wales
032: BELLEVUE (IGN)	: Efate & Erromango Is.	122: PICO DE LAS NIVIES	: Canary Is.
033: BERMUDA 1957	: Bermuda Is.	123: PITCAIRN ASTRO 1967	: Pitcairn Is.
034: BOGOTA OBSERVATORY	: Columbia	124: PROVISIONAL SOUTH CHILEAN 1963	: South Chile (near 53°S)
035: CAMPO INCHAUSPE	: Argentina	125: PROVISIONAL SOUTH AMERICAN 1956	: Mean Value
036: CANTON IS. 1966	: Phoenix Is.	126: PROVISIONAL SOUTH AMERICAN 1956	: Bolivia
037: CAPE	: South Africa	127: PROVISIONAL SOUTH AMERICAN 1956	: Chile-Northern Chile (near 19°S)
038: CAPE CANAVERAL	: Mean Value (Florida & Bahama Is.)	128: PROVISIONAL SOUTH AMERICAN 1956	: Chile-Southern Chile (near 43°S)
039: CARTHAGE	: Tunisia	129: PROVISIONAL SOUTH AMERICAN 1956	: Columbia
040: CHATHAM 1971	: Chatham Is. (New Zealand)	130: PROVISIONAL SOUTH AMERICAN 1956	: Ecuador
041: CHUA ASTRO	: Paraguay	131: PROVISIONAL SOUTH AMERICAN 1956	: Guyana
042: CORREGO ALEGRE	: Brazil	132: PROVISIONAL SOUTH AMERICAN 1956	: Peru
043: DJAKARTA (BATAVIA)	: Sumatra Is. (Indonesia)	133: PROVISIONAL SOUTH AMERICAN 1956	: Venezuela
044: DOS 1968	: Gizo Is. (New Georgia Is.)	134: PUERTO RICO	: Puerto Rico & Virgin Is.
045: EASTER IS. 1967	: Easter Is.	135: QATAR NATIONAL	: Qatar
046: EUROPEAN 1950 (Cont'd)	: Western Europe	136: QORNOQ	: South Greenland
047: EUROPEAN 1950 (Cont'd)	: Cyprus	137: ROME 1940	: Sardinia Is.
048: EUROPEAN 1950 (Cont'd)	: Egypt	138: SANTA BRAZ	: Sao Miguel, Santa Maria Is. (Azores)
049: EUROPEAN 1950 (Cont'd)	: England, Scotland, Channel & Shetland Is.	139: SANTO (DOS)	: Espirito Santo Is.
050: EUROPEAN 1950 (Cont'd)	: England, Ireland, Scotland & Shetland Is.	140: SAPPER HILL 1943	: East Falkland Is.
051: EUROPEAN 1950 (Cont'd)	: Greece	141: SOUTH AMERICAN 1969	: Mean Value
052: EUROPEAN 1950 (Cont'd)	: Iran	142: SOUTH AMERICAN 1969	: Argentina
053: EUROPEAN 1950 (Cont'd)	: Italy, Sardinia	143: SOUTH AMERICAN 1969	: Bolivia
054: EUROPEAN 1950 (Cont'd)	: Italy, Sicily	144: SOUTH AMERICAN 1969	: Brazil
055: EUROPEAN 1950 (Cont'd)	: Norway & Finland	145: SOUTH AMERICAN 1969	: Chile
056: EUROPEAN 1950 (Cont'd)	: Portugal & Spain	146: SOUTH AMERICAN 1969	: Columbia
057: EUROPEAN 1979	: Mean Value	147: SOUTH AMERICAN 1969	: Ecuador
058: GANDAJIKA BASE	: Republic of Maldives	148: SOUTH AMERICAN 1969	: Guyana
059: GEODETIC DATUM 1949	: New Zealand	149: SOUTH AMERICAN 1969	: Paraguay
060: GUAM 1963	: Guam Is.	150: SOUTH AMERICAN 1969	: Peru
061: GUX 1 ASTRO	: Guadalcanal Is.	151: SOUTH AMERICAN 1969	: Trinidad & Tobago
062: HJORSEY 1955	: Iceland	152: SOUTH AMERICAN 1969	: Venezuela
063: HONG KONG 1963	: Hong Kong	153: SOUTH ASIA	: Singapore
064: INDIAN	: Thailand & Vietnam	154: SOUTHEAST BASE	: Porto Santo & Madeira Is.
065: INDIAN	: Bangladesh, India & Nepal	155: SOUTHWEST BASE	: Faial, Graciosa, Pico, Sao Jorge & Terceira Is.
066: IRELAND 1965	: Ireland	156: TIMBALAI 1948	: Brunei & East Malaysia (Sarawak & Sabah)
067: ISTS 073 ASTRO 1969	: Diego Garcia	157: TOKYO	: Japan
068: JOHNSTON IS. 1961	: Johnston Is.	158: TOKYO	: Korea
069: KANDAWALA	: Sri Lanka	159: TOKYO	: Okinawa
070: KERGUELEN IS.	: Kerguelen Is.	160: TRISTAN ASTRO 1968	: Tristan da Cunha
071: KERTAUI 1943	: West Malaysia & Singapore	161: VITI LEVU 1916	: Viti Levu Is. (Fiji Is.)
072: LA REUNION	: Mascarene Is.	162: WAKE-ENIWETOK 1960	: Marshall Is.
073: L. C. 5 ASTRO	: Cayman Brac Is.	163: ZANDERIJ	: Surinam
074: LIBERIA 1964	: Liberia	164: BUKIT RIMPAH	: Bangka & Belitung Is. (Indonesia)
075: LUZON	: Philippines (excl. Mindanao Is.)	165: CAMP AREA ASTRO	: Camp Mornudo Area, Antarctica
076: LUZON	: Mindanao Is.	166: G. SEGARA	: Kalimantan Is. (Indonesia)
077: MAHE 1971	: Mahe Is.	167: HERAT NORTH	: Afghanistan
078: MARCO ASTRO	: Salvage Islands	168: HU-TZU-SHAN	: Taiwan
079: MASSAWA	: Eritrea (Ethiopia)	169: TANANARIVE OBSERVATORY 1925	: Madagascar
080: MERCHICH	: Morocco	170: YACARE	: Uruguay
081: MIDWAY ASTRO 1961	: Midway Is.	171: RT-90	: Sweden
082: MINNA	: Nigeria	172: CK42 (PULKOVO 1942)	: Russia
083: NAHRWAN	: Masirah Is. (Oman)	173: FINNISH KKJ	: Finland
084: NAHRWAN	: United Arab Emirates	174: PZ90	: Russia
085: NAHRWAN	: Saudi Arabia	175: CK95	: Russia
086: NAMIBIA	: Namibia		
087: MAPARIMA, BWI	: Trinidad & Tobago		
088: NORTH AMERICAN 1927	: Western United States		
089: NORTH AMERICAN 1927	: Eastern United States		
090: NORTH AMERICAN 1927	: Alaska		

# APPENDIX 3 WHAT IS SBAS?

A satellite-based augmentation system, or SBAS (Satellite Based Augmentation System), is an augmentation system that uses additional messages from satellite broadcasts to support regional and wide area augmentation. SBAS provides GPS signal corrections to SBAS users, for even better position accuracy, through the GPS error corrections that are widely broadcasted from the geostationary satellite.

SBAS is used in America, Europe, Japan and India. These four systems; WAAS, EGNOS, MSAS and GAGAN, have interoperability. The illustration below shows the coverage area for each provider. This manual uses "SBAS" for these four providers generically.



Provider	Satellite type	Longitude	Satellite No.
WAAS (Wide Area Augmentation System, America)	Intelsat Galaxy XV	133°W	135
	TeleSat Anik F1R	107.3°W	138
	Inmarsat-4-F3	98°W	133
EGNOS (Euro Geostationary Navigation Overlay Service, Europe)	Inmarsat-3-F2/AOR-E	15.5°W	120
	Artemis	21.5°E	124
	Inmarsat-4-F2	25°E	126
MSAS (Multi-Functional Satellite Augmentation System, Japan)	SES-5	5°E	136
	MTSAT-1R	140°E	129
GAGAN (GPS And GEO Augmented Navigation, India)	MTSAT-2	145°E	137
	GSAT-8	55°E	127
	GSAT-10	83°E	128

**SPECIFICATIONS OF SATELLITE COMPASS  
SCX-20**

**1 GENERAL**

- 1.1 Receiving frequency 1575.42 MHz (GPS/Galileo/QZSS/SBAS),  
1602.5625 MHz (GLONASS)
- 1.2 Tracking code C/A code (GPS/QZSS/SBAS), E1B (Galileo), L1OF (GLONASS)
- 1.3 Attitude resolution Heading/ Roll/ Pitch  
1.0° rms (static), 0.5° rms (dynamic)
- 1.4 Tracking bearing 45°/s
- 1.5 Heave accuracy 5 cm (1σ)
- 1.6 Attitude setting time 60 s approx.
- 1.7 Positional accuracy (dependent on ionospheric activity and multipath)  
GNSS 5 m approx. (2drms, HDOP<4)  
MSAS 4 m approx. (2drms, HDOP<4)  
WAAS 3 m approx. (2drms, HDOP<4)
- 1.8 Position fixing time 50 s approx.
- 1.9 Update interval Attitude: 50 Hz max, Position: 10 Hz max.
- 1.10 Ship's speed accuracy  
SOG 0.02 kn rms (tracking satellites 5 or more)  
0.2 kn rms (tracking satellites 3 or 4)  
VBW (speed on ground) 0.02 kn rms (tracking satellites 5 or more, at antenna position)  
0.08 kn rms (tracking satellites 5 or more, at another position)  
2.0% of ship's speed or 0.2 kn whichever is the greater  
(tracking satellites 3 or 4)
- 1.11 Atmosphere sensor  
Pressure 850 to 1100 hPa (temperature range: 0 to +50°C),  
accuracy: ±1.0 hPa (offset adjustment)  
Temperature -20°C to +55°C (relative wind: 4 kn or more),  
accuracy: ±2.0°C (offset adjustment)

**2 INTERFACE**

- 2.1 Number of ports NMEA2000: 1 port
- 2.2 NMEA2000 PGN  
Input 059392/904, 060160/416/928, 061184, 065240, 126208/720, 130847  
Output 059392/904, 060928, 061184, 065280, 126208/464/720/992/993,  
126996/998, 127250/251/252/257/258, 129025/026/029/538/539/540,  
130310/312/314/316/577\*/578/816/817/818/819/822/823/833/834,  
130842/843/845/846/847

\*: Speed output rate at 200 ms (5 Hz) max. with 100 ms (10 Hz) set.

**3 POWER SUPPLY**

12-24 VDC (10.8-31.2V): 0.2-0.1 A (LEN: 4 at 9 V)

**4 ENVIRONMENTAL CONDITIONS**

- 4.1 Ambient temperature -25°C to +55°C (storage: -30°C to +70°C)
- 4.2 Relative humidity 95% or less at +40°C
- 4.3 Degree of protection IP56
- 4.4 Vibration IEC 60945 Ed.4

**5 UNIT COLOR**






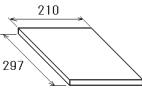
N9.5

# PACKING LIST

20BK-X-9851 -3 1/1

SCX-20-\*

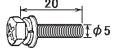
A-1

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
<b>ユニット UNIT</b>			
サテライトコンパス SATELLITE COMPASS		SCX-20 000-036-766-00	1
<b>工事材料 INSTALLATION MATERIALS</b>			
ケーブル (ケミヒン) NMEA CABLE ASSEMBLY		FRU-NMEA-PMMFF-060 001-533-080-00	1
工事材料 INSTALLATION MATERIALS		CP20-04601 001-556-150-00	1
ルーフマウントキット ROOF MOUNT KIT		CP20-04602 001-556-170-00	1 (*1)
ポールマウントキット POLE MOUNT KIT		CP20-04603 001-556-200-00	1 (*2)
マスト取付金具 MAST MOUNTING KIT		CP20-04605 001-556-240-00	1 (*3)
<b>図書 DOCUMENT</b>			
取扱説明書 (和/英) OPERATOR'S MANUAL (JP/EN)		OMC-72860-* 000-195-293-1*	1

A-2

## FURUNO

CODE NO.	001-556-150-00	20BK-X-9401 -0
TYPE	CP20-04601	1/1

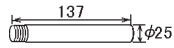
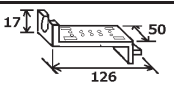
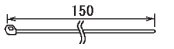

工事材料表					
INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	+77°セットUIせねスB UP SET UI SCREW		M5X20 SUS304 CODE NO. 000-160-442-10	3	





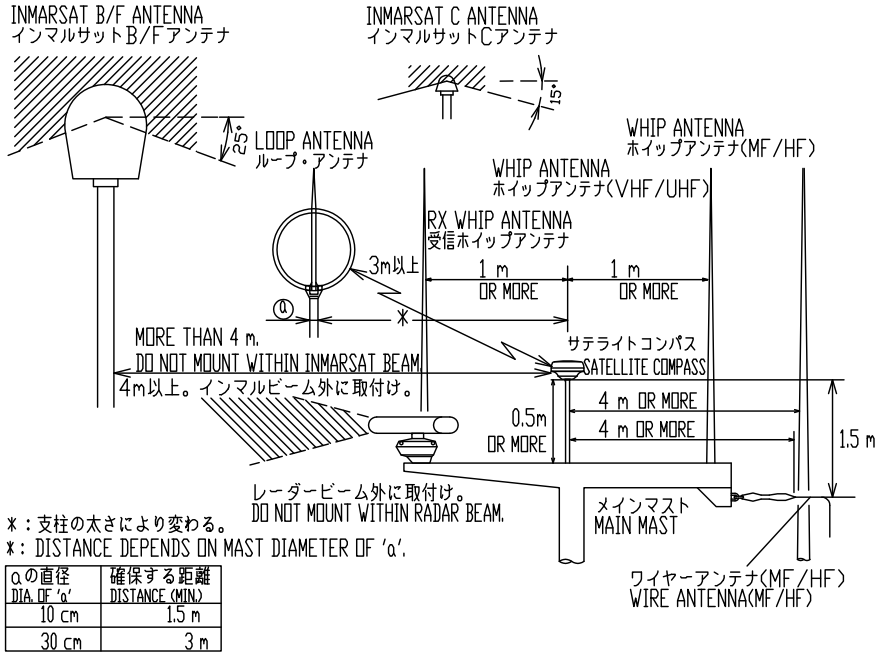
# FURUNO

CODE NO.	001-556-240-00	20BK-X-9404 -0
TYPE	CP20-04605	1/1

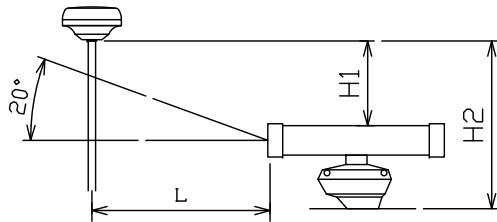
工事材料表					
INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	パイプ PIPE		20-007-3011-4 CODE NO. 100-183-264-10	1	
2	取付補助金具 FIXING SUPPORT FIXTURE		20-040-1117-2 CODE NO. 100-429-742-10	1	
3	コンベクタス CABLE TIE		CV-150B CODE NO. 000-167-183-10	1	
4	ホースクランプ (ABA) HOSE CLAMP		SUS316 12MM 38-50 CODE NO. 000-196-736-10	2	

## 取付位置 MOUNTING LOCATION

他の機器のアンテナから下の図の距離以上離す。  
THIS FIGURE SHOWS THE SEPARATION DISTANCES FROM OTHER ANTENNAS TO AVOID MUTUAL INTERFERENCE.

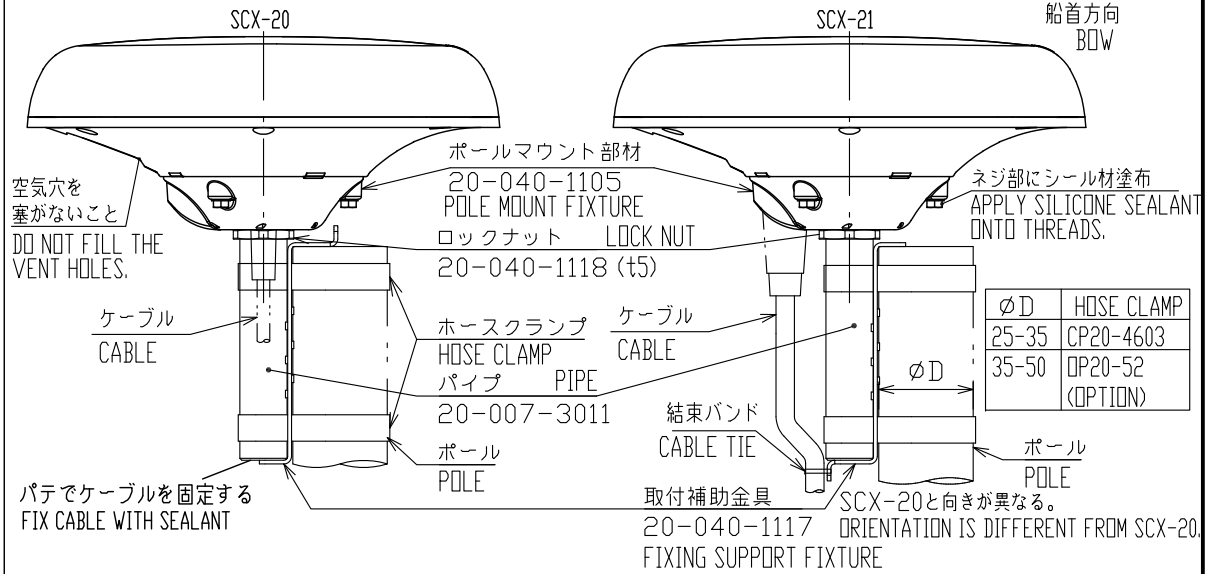


## B) レーダー空中線部との位置関係 RADAR ANTENNA LOCATION



H2が1m以上で、Lが3m以上の時、レーダーからの仰角は20度以上。  
Lが3m未満のときは、H1は0.8m以上とること。  
IF H2 IS AT LEAST 1 m AND L IS MORE THAN 3 m, THE ELEVATION ANGLE FROM THE RADAR SHOULD BE MORE THAN 20°. IF L IS LESS THAN 3 m, H1 SHOULD BE MORE THAN 0.8 m.

## A) マストへの取付け MAST MOUNTING

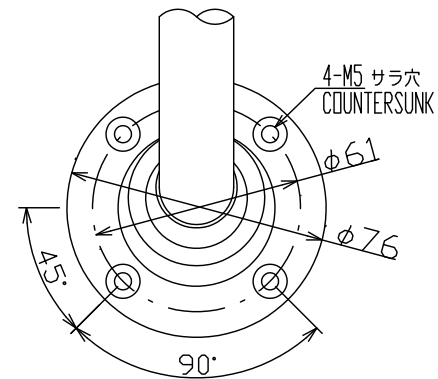


## C) 取付ける場所が傾斜しているとき ANTENNA BASE MOUNTING ON INCLINATION SURFACE

オプションのアンテナベースを使う。  
USE OPTIONAL ANTENNA BASE.

アンテナベース基部  
MOUNTING DIMENSIONS OF ANTENNA BASE.

傾斜 INCLINATION	-5° - 33°
装備方法 MOUNTING METHOD	
名称 NAME	直型アンテナベース RIGHT ANGLE ANTENNA BASE
型式 TYPE	No.13-QA330
コード番号 CODE No.	000-803-239



DRAWN 27/Sep/2019 T.YAMASAKI	TITLE SCX-20/21
CHECKED 27/Sep/2019 H.MAKI	名称 衛星コンパス
APPROVED	装備要領図
SCALE MASS	NAME SATELLITE COMPASS
DWG. No. C7286-Y01-A	REF. No. INSTALLATION PROCEDURE

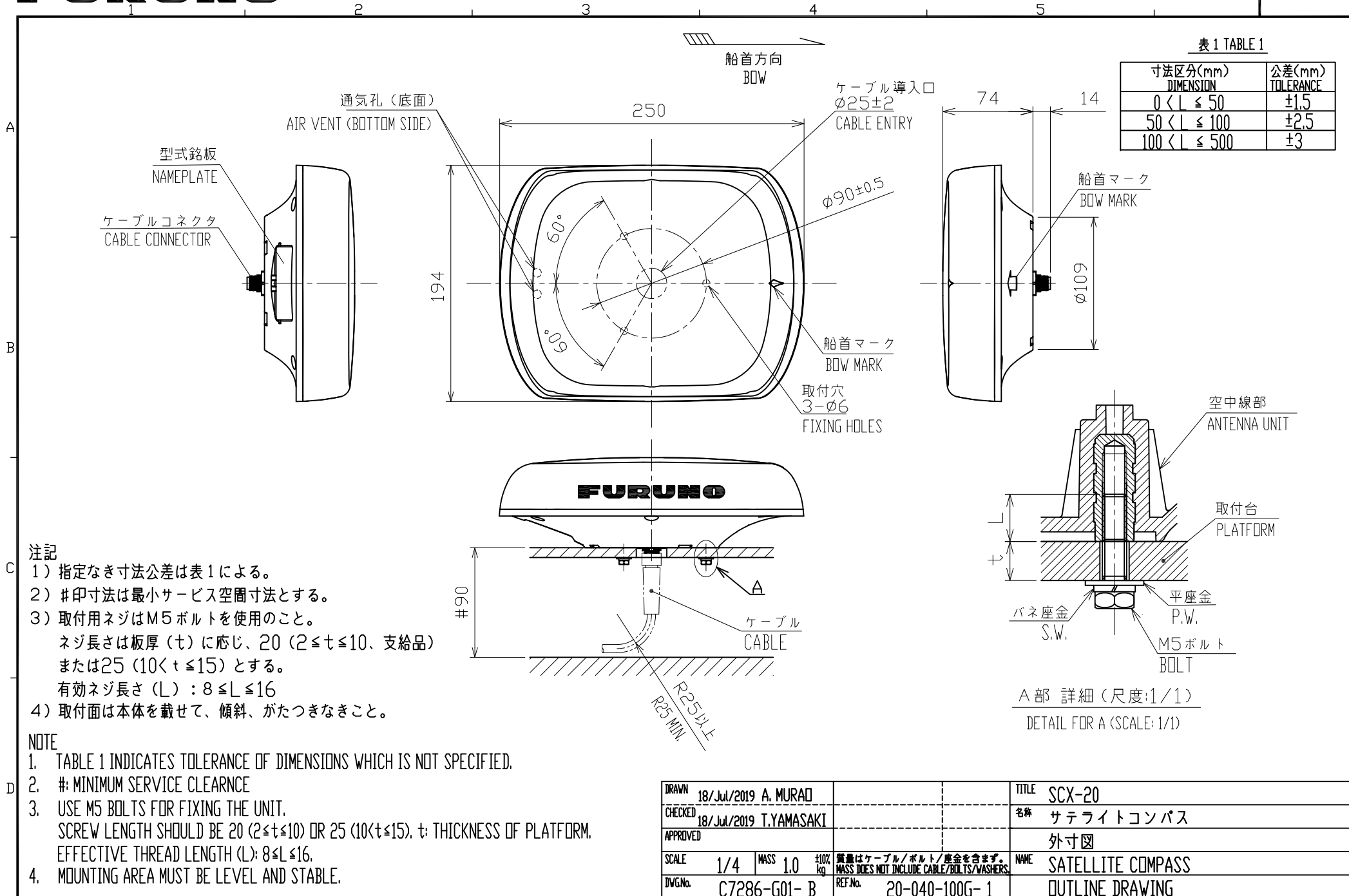


表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

注記

- 1) 指定なき寸法公差は表1による。
- 2) #印寸法は最小サービス空間寸法とする。
- 3) 取付用ネジはM5ボルトを使用のこと。  
ネジ長さは板厚(t)に応じ、20 (2 ≤ t ≤ 10、支給品) または25 (10 < t ≤ 15) とする。  
有効ネジ長さ(L) : 8 ≤ L ≤ 16
- 4) 取付面は本体を載せて、傾斜、がたつきなきこと。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. # MINIMUM SERVICE CLEARANCE
3. USE M5 BOLTS FOR FIXING THE UNIT.  
SCREW LENGTH SHOULD BE 20 (2 ≤ t ≤ 10) OR 25 (10 < t ≤ 15), t: THICKNESS OF PLATFORM.  
EFFECTIVE THREAD LENGTH (L): 8 ≤ L ≤ 16.
4. MOUNTING AREA MUST BE LEVEL AND STABLE.

DRAWN	18/Jul/2019 A. MURAD	TITLE	SCX-20
CHECKED	18/Jul/2019 T. YAMASAKI	名称	サテライトコンパス
APPROVED		外寸図	
SCALE	1/4	質量	1.0 ±10% kg
DWG No.	C7286-G01-B	質量はケーブル/ボルト/座金を含まず。 MASS DOES NOT INCLUDE CABLE/BOLTS/WASHERS.	NAME
		REF.No.	20-040-100G-1
			サテライトコンパス OUTLINE DRAWING

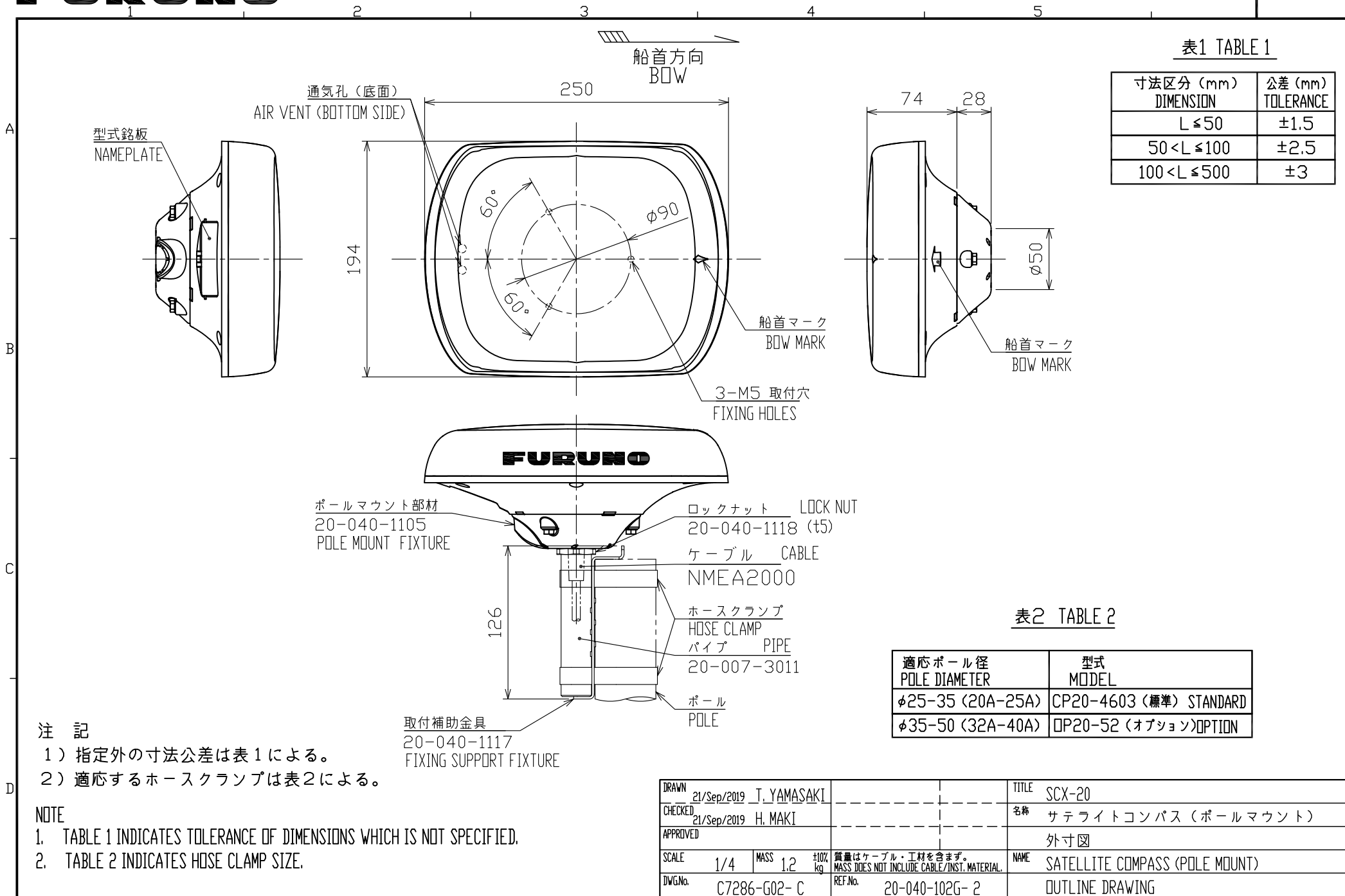


表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

表2 TABLE 2

適応ポール径 POLE DIAMETER	型式 MODEL
φ25-35 (20A-25A)	CP20-4603 (標準) STANDARD
φ35-50 (32A-40A)	CP20-52 (オプション) OPTION

注記  
 1) 指定外の寸法公差は表1による。  
 2) 適応するホースクランプは表2による。

NOTE  
 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. TABLE 2 INDICATES HOSE CLAMP SIZE.

DRAWN	21/Sep/2019	T. YAMASAKI	TITLE	SCX-20	
CHECKED	21/Sep/2019	H. MAKI	名称	サテライトコンパス (ポールマウント)	
APPROVED			外寸図		
SCALE	1/4	MASS 1.2 ±10% kg	質量はケーブル・工材を含みません。 MASS DOES NOT INCLUDE CABLE/INST. MATERIAL.	NAME	
DWG.No.	C7286-G02-C		REF.No.	20-040-102G-2	SATELLITE COMPASS (POLE MOUNT)
					OUTLINE DRAWING

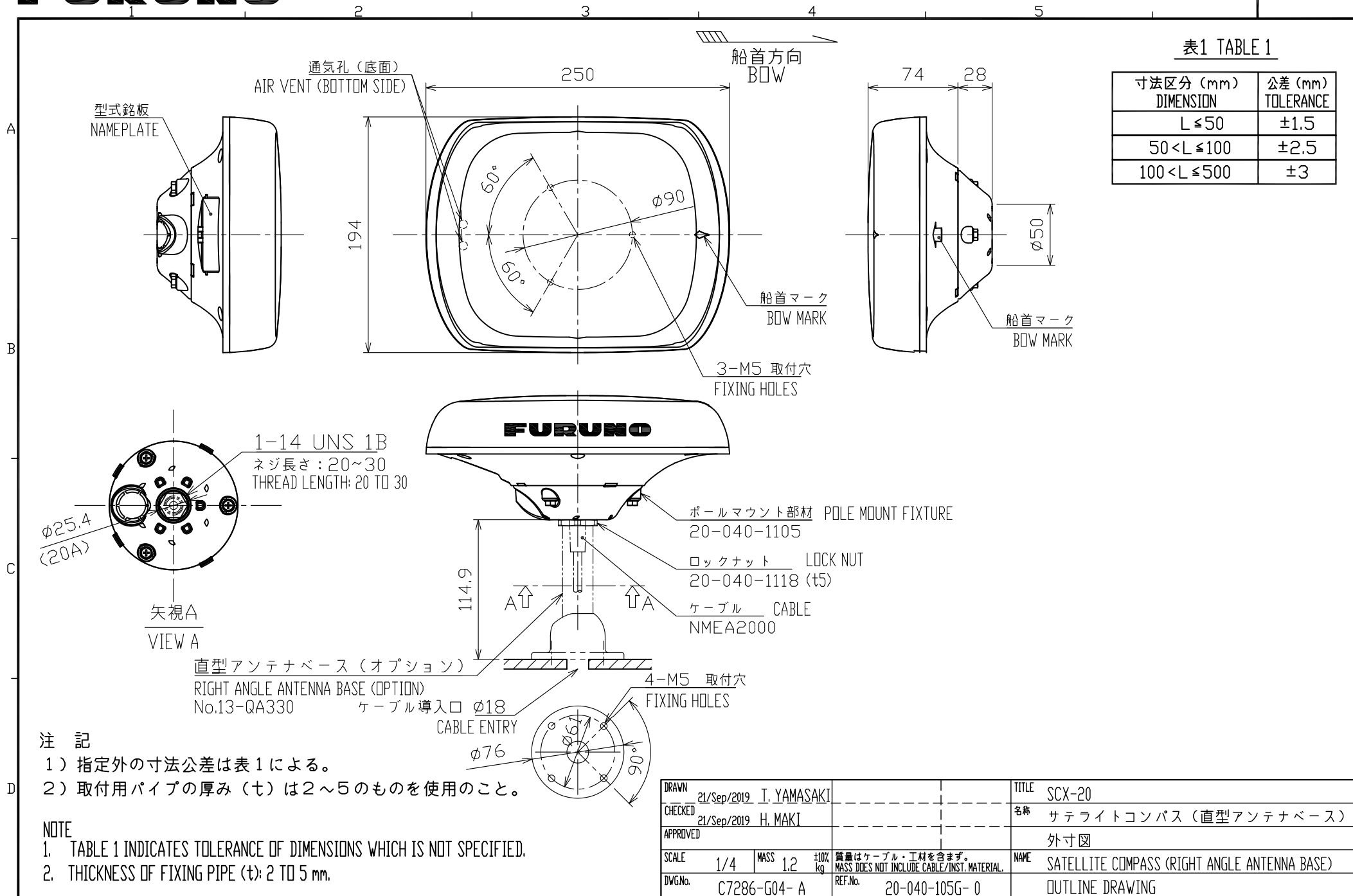


表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

注記  
 1) 指定外の寸法公差は表1による。  
 2) 取付用パイプの厚み (t) は2~5のものを使用のこと。

NOTE  
 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 2. THICKNESS OF FIXING PIPE (t): 2 TO 5 mm.

DRAWN	21/Sep/2019	T. YAMASAKI	TITLE	SCX-20
CHECKED	21/Sep/2019	H. MAKI	名称	サテライトコンパス (直型アンテナベース)
APPROVED			外寸図	
SCALE	1/4	MASS	1.2 ±10% kg	質量はケーブル・工材を含まず。 MASS DOES NOT INCLUDE CABLE/INST. MATERIAL.
DWG.No.	C7286-G04-A	REF.No.	20-040-105G-0	NAME
				SATELLITE COMPASS (RIGHT ANGLE ANTENNA BASE)
				OUTLINE DRAWING

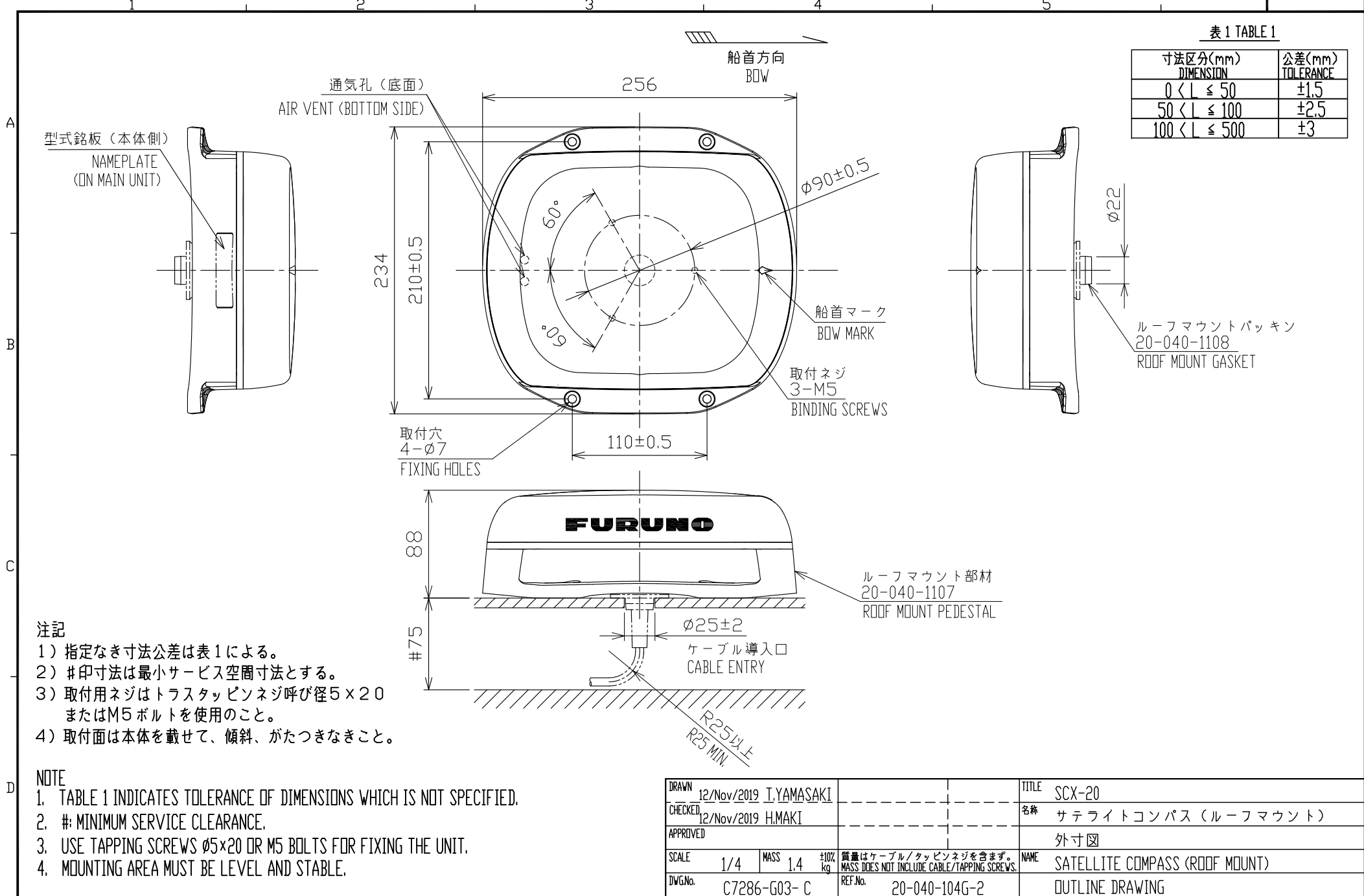


表 1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

注記

- 1) 指定なき寸法公差は表 1 による。
- 2) #印寸法は最小サービス空間寸法とする。
- 3) 取付ネジはトラスタップネジ呼び径5×20 またはM5 ボルトを使用のこと。
- 4) 取付面は本体を載せて、傾斜、がたつきなきこと。

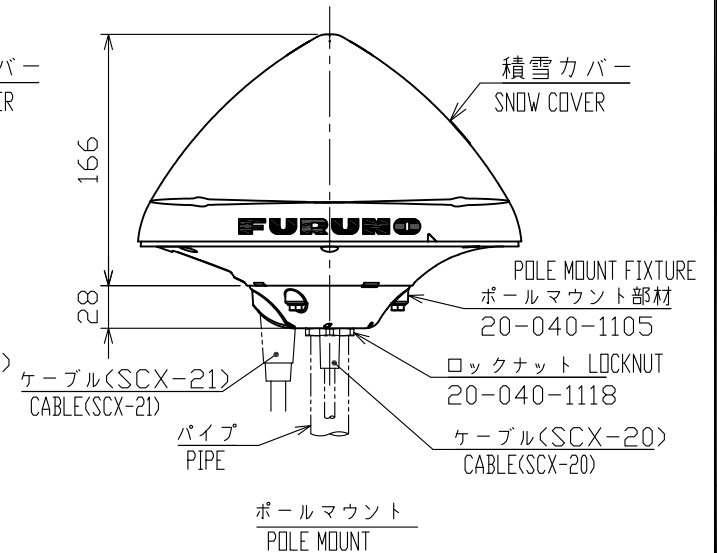
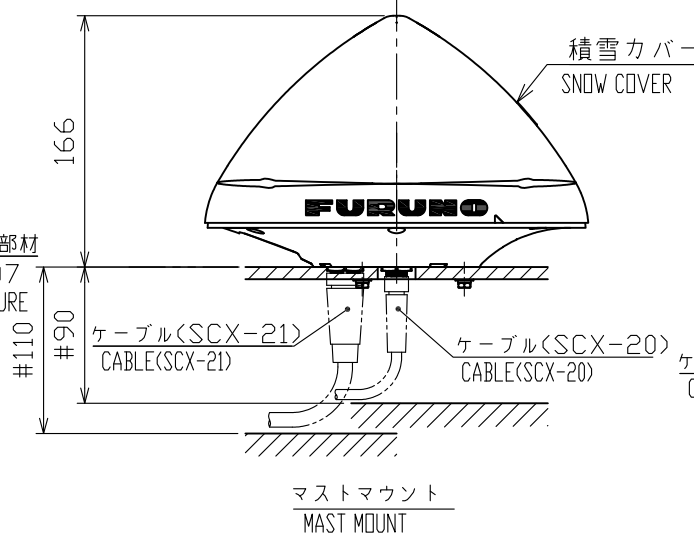
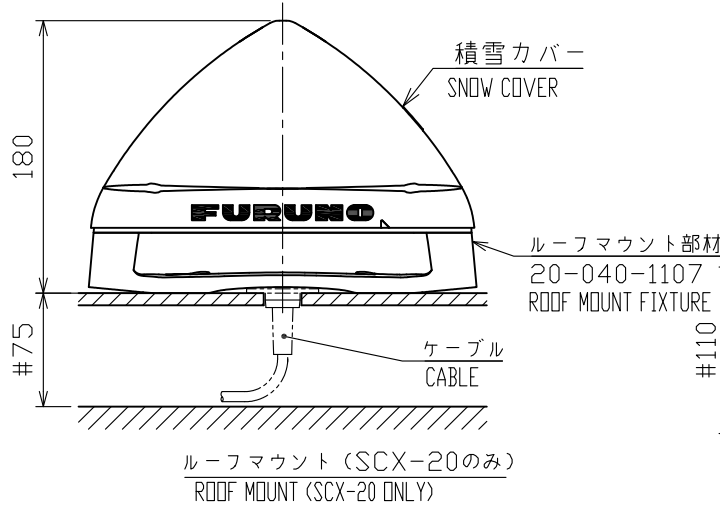
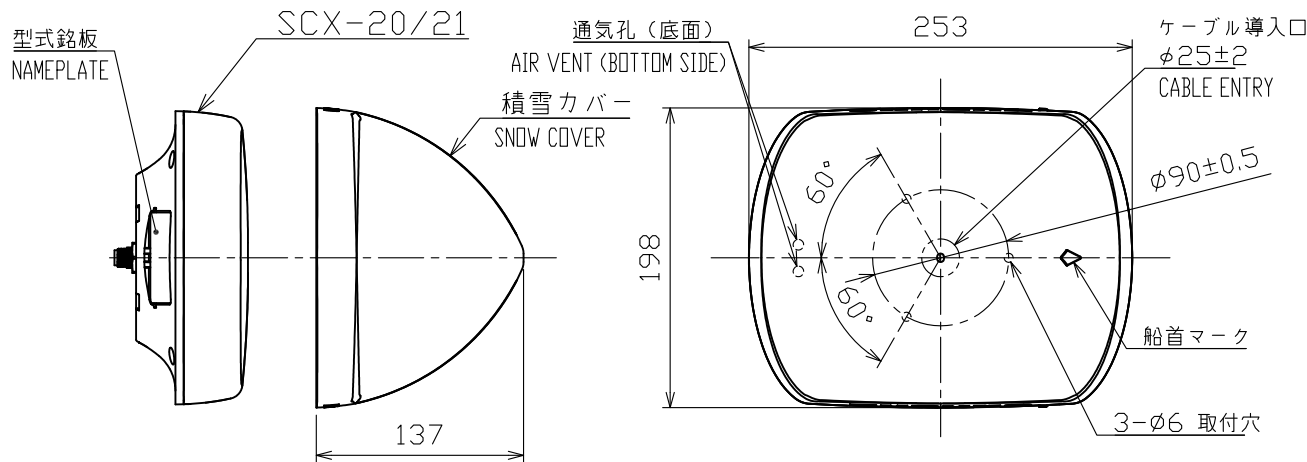
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS φ5×20 OR M5 BOLTS FOR FIXING THE UNIT.
4. MOUNTING AREA MUST BE LEVEL AND STABLE.

DRAWN	12/Nov/2019	T.YAMASAKI	TITLE	SCX-20	
CHECKED	12/Nov/2019	H.MAKI	名称	サテライトコンパス (ルーフマウント)	
APPROVED			外寸図		
SCALE	1/4	MASS 1.4 ±10% kg	質量はケーブル/タップネジを含まず。 MASS DOES NOT INCLUDE CABLE/TAPPING SCREWS.	NAME	
DWGNo.	C7286-G03-C		REF.No.	20-040-104G-2	SATELLITE COMPASS (ROOF MOUNT)
					OUTLINE DRAWING

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3



注記

- 1) 指定外の寸法公差は表1による。
- 2) #印寸法は最小サービス空間寸法とする。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.

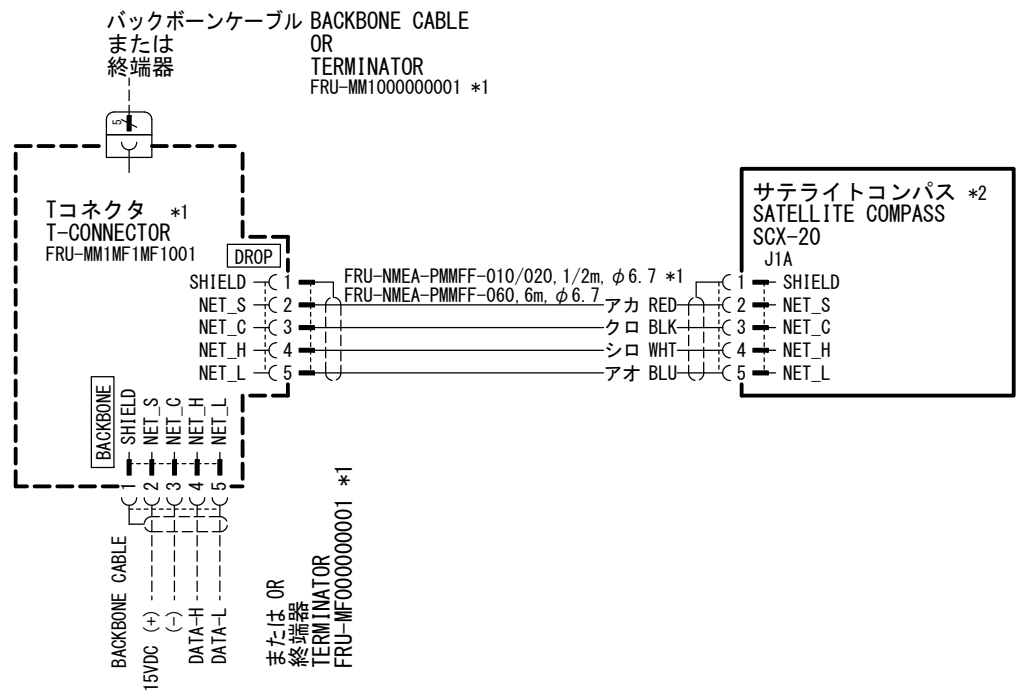
DRAWN	26/Nov/2019	T.YAMASAKI	TITLE	SCX-20/21
CHECKED	26/Nov/2019	H.MAKI	名称	積雪カバー
APPROVED				装備要領
SCALE	1/5	MASS	NAME	SNOW COVER
DWG No.	C7286-Y02-A		REF. No.	20-040-110G-1
				INSTALLATION INSTRUCTION



A

B

C



注記

- \* 1) オプション。
- \* 2) データ表示には、表示器が必要。

NOTE

- \*1: OPTION.
- \*2: CONNECTION WITH A DISPLAY UNIT IS REQUIRED TO DISPLAY THE DATA.

DRAWN		24/Jun/2019	R. FUJIYAMA	TITLE		SCX-20	
CHECKED		24/Jun/2019	T. YAMASAKI	名称		サテライトコンパス	
APPROVED						相互結線図	
SCALE	MASS			NAME		SATELLITE COMPASS	
DWG. No.	C7286-C01- B	REF. No.	20-040-5001-0	INTERCONNECTION DIAGRAM			